

# THE IRON AGE

THURSDAY, MAY 28, 1891.

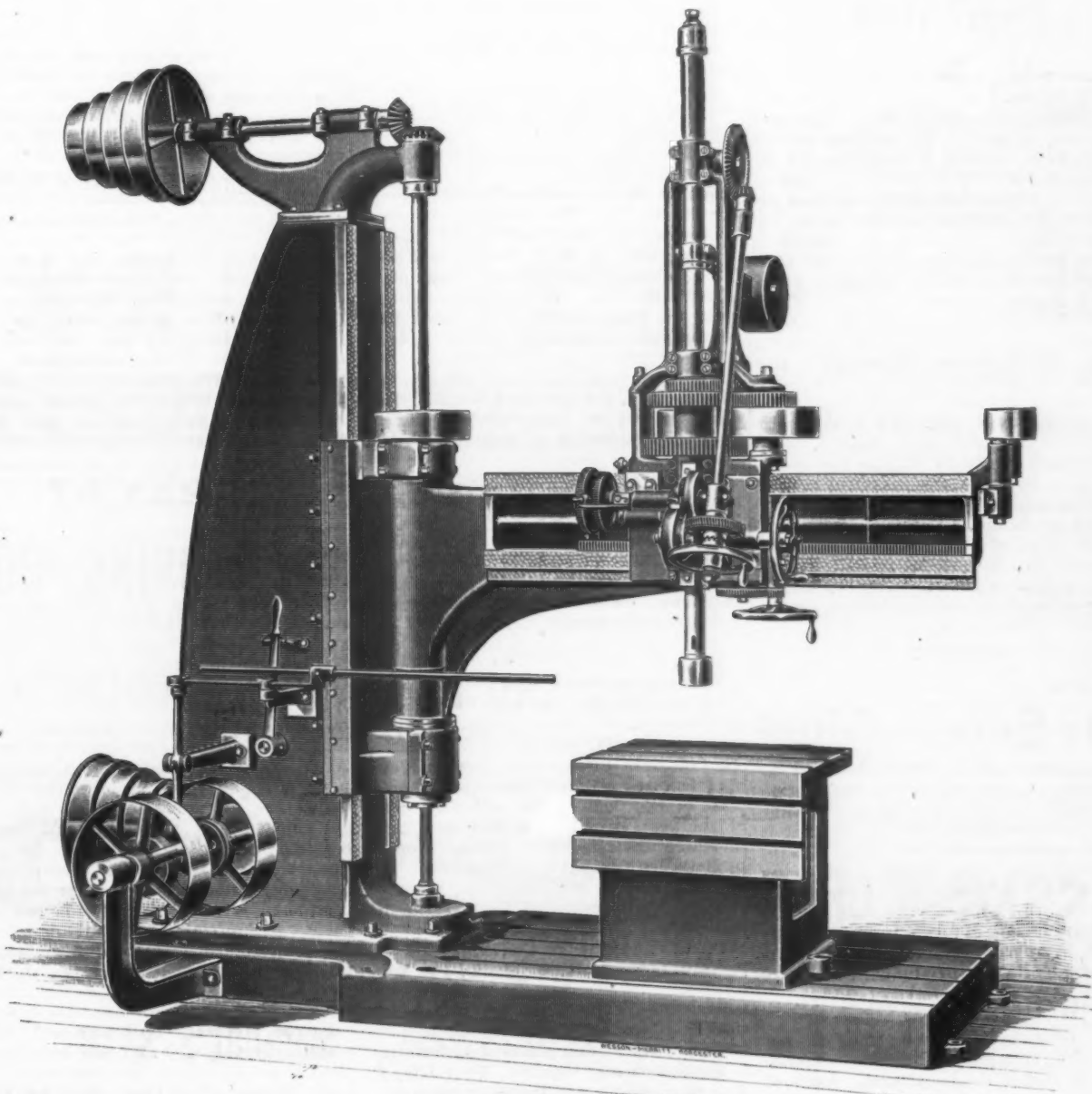
## The Prentice Radial Drill.

Prentice Brothers of Worcester, Mass., have just placed on the market their No. 2 radial drill, which we here illustrate. The countershaft is at the base of the column, and when arranged as shown in the cut the machine is intended to stand at right angles to the main shaft. When it is desired to place the drill in line with the shaft the countershaft is placed at the

to the upright column, there is no more spring when drilling at the extreme end of the arm than would be with the machine in only one casting. The spindle is driven by gearing and is back geared. Power is applied thereto by a gear connected with an intermediate pulley, which is driven by an endless belt running over idle pulleys. The spindle is counterbalanced, and has hand and power feed and quick approach and return movement. It has four changes

for attachment to overhead timbers or to the floor, and with cone to belt to the top cone, can be supplied. This machine will drill holes up to 3 inches in diameter. When desired tilting tables are provided in place of the plain table.

The principal measurements are as follows: Size of bed plate, 7 feet 10 inches by 3 feet 8 inches; size of table, 23 x 27 inches, 24 inches high; floor space required with tapping pulleys on back of



THE PRENTICE No. 2 RADIAL DRILL.

end. The machine has broad base plate, heavily ribbed on its under side, which is provided with T slots. The metal in the column is distributed in a manner to withstand the greatest strain that can be brought to bear upon it.

The saddle carrying the radial arm is unusually large, and is carefully fitted to the column, on which it is vertically adjustable by power. Power for this purpose is applied from a train of gears inside of the base of the column, and operated by a lever from the outside. The trunnions of the radial arm are ample, so designed that, when the saddle is clamped

of feed. The head is movable along the radial arm by means of a hand wheel rack and pinion. The idle pulley at the end of the radial arm has adjustment to keep the endless belt at the proper tension.

The machine is supplied with a table with T slots to bolt the work upon, and can be bolted to the base. All the hand wheels and operating levers are within easy grasp of the operator. When this machine is desired for tapping purposes two friction pulleys are supplied, as shown in illustration. When not so desired but one pulley is furnished, or, if more convenient to the purchaser, a countershaft

column, 9 feet 1 inch by 3 feet 8 inches; floor space required with tapping pulleys on side of column, 8 feet 2 inches by 4 feet 4 inches; floor space required with driving pulleys on back of column, 8 feet 18 inches by 3 feet 8 inches; floor space required with driving pulleys on side of column, 8 feet 2 inches by 3 feet 19 inches; total height, 9 feet 8 inches; weight, 9800 pounds; vertical traverse of saddle on column, 35 inches; vertical traverse of spindle, 16 inches; 5-foot radial arm will drill to the center of a circle of 116 inches; 6-foot radial arm will drill to the center of a circle of 140 inches; maximum distance

from spindle to base plate, 68 inches; minimum distance from spindle to base plate, 19 inches; diameter of spindle, 2½ inches; hole in spindle fits Morse taper No. 4; width of belt on cones, 3½ inches; diameter of driving pulleys, 16 inches; diameter of pulley on upright shaft, 12 inches; face of same, 3½ inches; diameter of pulley to drive spindle, 12 inches; face of same, 3½ inches; maximum distance from center of upright shaft to center of spindle, 74½ inches.

### Rapid Unloading of Low-Grade Freights.

G. Blumcke, a well-known mechanical engineer of Hamburg, Germany, who represents the Westinghouse Machine Company of Pittsburgh, Pa., in Germany and Austria-Hungary, has devised and put into very successful operation on a number of freight vessels entering the seaports of North Germany an invention for rapidly and cheaply unloading coal, iron ore and low-grade freights. The ordinary colliers which enter the port of Hamburg, for instance, require 72 men, working 24 hours, to unload them, whereas with the new invention Mr. Blumcke is able to do the same work in 12 hours with 30 men. Each collier has four hatches, and between each pair of hatches a small Westinghouse engine is placed temporarily on deck, which is supplied with steam through a hose from a portable boiler located on the adjoining dock. Shafts temporarily bolted at one side of each hatch are driven by belts from the engine. Each shaft carries three grooved friction spools. The workmen by simply bearing down on a treadle, cause the friction wheels to engage the spool, which in turn lift the basketful of coal from the hold of the vessel at a speed of 12 feet per second. The whole apparatus, consisting of two small Westinghouse engines and the four shafts, is easily put in place on deck in 30 minutes' time. Steam is furnished from portable boilers on the docks at Hamburg as an article of merchandise, and is therefore readily available for sailing vessels such as these colliers are.

In the first plant put into operation by Mr. Blumcke he used 10 horse-power engines, which, generally speaking, furnished ample power. When, however, as sometimes happened, all six treadles on each engine would be pressed at the same time (thus demanding the engine that it lift six baskets at once) the power was insufficient, and the engine would stop until relieved of some of the load. For this reason Mr. Blumcke has since used 25 horse-power engines for the purpose, which are found to have abundant power to lift all the baskets at the standard speed at once.

The Southwestern iron trade is not responding so rapidly to improving conditions as that of the Northwest. Lack of business from railroads appears to be the leading cause of the dullness in that section. Rolling mills and carbide establishments are particularly suffering for want of work, and important establishments in that line on the Ohio River and further south are wholly idle, without much prospect of an early resumption. Crop prospects are discussed with hopefulness, but apparently some distrust is felt that perhaps even good crops may not at once restore good times. The financial situation is not entirely unclouded, and scarcity of money may be a factor in the situation as well as large crops.

A large steel works in Eastern Pennsylvania has purchased 100,000 tons of Edison concentrates, at 7 cents a unit at concentrating mill.

## American Tin-Plate Works.

The *Metal Worker* has collected the following data in regard to the preparations which are now going on to produce American tin plate:

### LIST OF TIN-PLATE WORKS.

The works which have actually made tin plate up to the present time are as follows:

1. The United States Iron and Tin Plate Company, Limited, Demmler, Pa.
2. P. H. Laufman & Co., Limited, Apollo, Pa.
3. Norton Bros., Chicago, Ill.
4. The St. Louis Stamping Company, St. Louis, Mo.

The works which are known to be in course of erection are as follows:

1. The Britton Rolling Mill Company, Cleveland, Ohio.
2. Somers Bros., Brooklyn, N. Y.
3. The Lewis Steel Sheet and Tin Plate Company, Joliet, Ill.
4. The Welsh-American Tin Plate Company, Philadelphia.

Works are also projected at Chicago by the Chicago Tin Plate Company, composed of Richard J. Reis and others; and at Elwood, Ind., by A. L. Conger and associates, who are interested in Indiana plate-glass enterprises. Of these proposed concerns the plans for the first named have been completed for some time, and bids are being received on the machinery.

The Anderson Tin Plate Company, Anderson, Ind., are also in the field. Still others have plans under advisement, and no doubt additions to this list will be made in a very short time.

The list of works, both building and projected, is therefore seen to number 11. Of these, Norton Brothers, the St. Louis Stamping Company and Somers Brothers will for some time consume in their own works about all the tin plate they make. The others will manufacture for the open market.

### PITTSBURGH.

The United States Iron and Tin Plate Company, Limited, are actively engaged, at Demmler, Pa., in the production of tin plate as a regular product of their works. They began in this line about October 1, and manufactured about 50 tons of bright tin plate of excellent quality up to the close of the year, since which time they have increased their facilities. They propose to make both bright and terne plate, and are enlarging their rolling mill, in order to meet the necessities of the tin-plate department.

P. H. Laufman & Co., Limited, are making terne plate at Apollo, Pa., and have already established a trade in it of considerable extent, having turned out their first box in October. They propose to make long roofing plates of such widths as the tanners may require. They have at present plates 20 x 56 inches in stock, and expect to have in a short time 22, 24, 26 and 28 inch widths by 56 and other long lengths up to 96 inches. Samples of the latter product are now on exhibition. Instead of branding their plates IC, IX, &c., they are putting the gauge number on. They do not undertake at present to make plates lighter than IX or No. 28 gauge.

### CHICAGO.

Norton Brothers, who are extensive manufacturers of cans at Chicago, imported from Wales last fall one of latest improved tinning stacks and set it up in their establishment, in order to operate it until they became familiar with the process used. They are now making quite a quantity of tin plate. It has a capacity of 40 boxes a day. They are now putting in their own automatic process, and expect to secure

a greatly increased output from apparatus of the same size. They are also building a sheet mill and will roll their own steel sheets. The firm are, however, such large consumers of tin plate that it will take considerable time for them to develop their tin-plate plant to a sufficient extent to meet their own requirements. They expect eventually to manufacture for the open market.

### ST. LOUIS.

The St. Louis Stamping Company are operating a small tin-plate plant and turning out a regular product, but less attention is at present paid to the size of the output than to the education of their workmen and to finding out how the tinning is done so as to suggest American improvements. They are developing a system of automatic continuous work, and have a new pot for tinning partly done. It is the experience of this company that the tinning of the plates is a comparatively easy matter, but that few are able to produce plates fit to be tinned. Active preparations are now being made by the St. Louis Stamping Company for a new rolling mill to be devoted especially to tin-plate work. It will contain three trains of rolls constructed upon their own ideas and based somewhat upon their experience in rolling thin plates for galvanizing and in smooth rolling blanks for their granite ware. It will be some time, however, before this new plant is at work, as the foundations have just been laid and the machinery has not been completed. As the company will consume only a part of their expected output, the general market will receive a supply of tin plate from them shortly after they get into operation, which is now expected to be about July 1. The capacity of the new plant is put at 400 to 500 boxes per day.

### CLEVELAND.

The Britton Rolling Mill Company, at Cleveland, Ohio, is composed of practical rolling mill people who have just completed a new plant for the manufacture of steel plates and sheets, and are adding facilities for the manufacture of tin plate. It was the intention of the company when they erected their mill to put in a galvanizing plant also, on account of their long experience in that branch of trade. After examining carefully into the prospects of the tin plate business they abandoned the galvanizing project and concluded to devote the energy and capital required in that department to the production of tin plate. They have their machinery ordered, much of it has been completed, and they expect to be running their tin-plate rolls in July, or at the latest in August. They will manufacture tin plate for the open market.

### BROOKLYN.

Somers Brothers, Third street and Third avenue, Brooklyn, N. Y., are building a plant to be known as the Somerton Tin-plate Works. The foundations are now being laid for the works and contracts have been let for the machinery, the construction of which is being rapidly pushed. The buildings will cover an area of 305 x 75 feet and the front will consist of a six-story building in which the plate will be packed and cans will also be manufactured. The rolling mill will be on the ground floor and will contain six trains for rolling black sheets, which are being built by the A. Garrison Foundry Company of Pittsburgh. Each set of rolls will be independent, so that the breakage of one will not stop all the trains. The rolling will be done in packs, as is at present done in Wales. The steel bars will be obtained from the steel manufacturers, and will probably be open-hearth steel. The tinning department will comprise four sets of pots or tinning machines, known



as the Daniel Edwards & Co. tinning pots, which have been ordered from Wales. Power will be supplied by a 600 horse power Corliss compound tandem engine built by Corliss of Providence. The entire structure will be of iron and brick, the iron work being furnished by the Edgmoor Iron Company of Wilmington, Del. The estimated cost of the plant is \$300,000. It was designed by the Somers Brothers throughout and they are themselves superintending the erection. They had the manufacture of tin plate in contemplation before the passage of the McKinley bill and visited Wales last year, making a very thorough study of the system in use there. They claim that they have thus been able to make many improvements on Welsh methods, principally in the arrangement of the mill. They now expect to be turning out tin plate by September 1, though they recognize the fact that delays may occur and defer the time of starting. Their product will be a steel stamping plate, finely finished, and will be made by the regular palm oil process. It will further consist entirely of 14 x 20 plate, most of it IC, but some IX and IXX. The capacity of the works will be from 2000 to 2500 boxes per week, half of which will be used in their own works and the rest sold to the general trade. The firm have long been engaged in the manufacture of decorated tin cans—that is, the fine quality of tin cans for packing tobacco, spices, toilet articles, &c.

## PHILADELPHIA.

The Welsh-American Tin Plate Company of Pennsylvania have been organized for the manufacture of tin and terne plates, black plates, taggers and sheet steel. They have a capital of \$1,000,000, and their president is J. L. McDaniel of the McCollough Iron Company, well known everywhere as being among the most extensive makers of galvanized sheet iron. F. R. Phillips, formerly of Wales, but for some time past a resident of this country, is chairman of the Board of Directors. He is an expert in tin-plate making. Other practical men are also associated with this scheme. It is the purpose of the company to erect four complete mills, with a product of 2000 boxes of finished tin plates per week, and increase the plant to 20 mills, with a product of 10,000 boxes per week or 500,000 boxes per annum. Their product will go on to the open market.

## JOLIET.

The Lewis Steel Sheet and Tin Plate Company were incorporated the past winter under the laws of Illinois, with an authorized capital stock of \$500,000. The incorporators are J. Davis Lewis, D. Trevor Lewis and Nathaniel D. Lewis, who have recently arrived in this country from Wales. They have secured a site for a tin-plate plant at Joliet, and ground was broken for the foundations some time in April.

## PHILADELPHIA.

Marshall Brothers & Co., at their galvanizing works, at Front and Girard avenue, Philadelphia, are preparing three tinning pots for use, and are building a fourth one. The black sheets they use will be made at their own rolling mill, at Beech and Marlborough streets, where they have four sets of rolls. They expect to have plates ready for the market by June 1, and will turn out IC, IX and heavier down to No. 10 gauge. To begin with they will make only leaded plates and terne plates. They inform us that the process they will employ, which is to be a modification of the patent roller process, involves the use of special pickling machinery, with labor-saving features. They will combine the palm oil and flux processes, using a special

flux, which is the result of their former investigations in making leaded plate. So far as possible they intend to make their plate of the galvanized-iron sizes, but will be prepared to cut the sheets to whatever size the trade requires. They inform us that it is their intention to make a roofing plate carrying an exceptionally heavy coating.

## TINNING PLANTS.

For some time past, as our readers already know, the firm of Fleming, Hamilton & Co., Pittsburgh, have been tinning on a small scale. At first their scheme was to recoat plates carrying very thin metal brought from the other side. More recently they have extended their enterprise to include coating black plates purchased from American mills. They have given a special brand to their product, entirely roofing plates, and it is already in high favor in the circle in which it has been sold.

The importing house of N. & G. Taylor Company, Philadelphia, some time ago began experimental work, and now have a small plant at Front and Laurel streets, Philadelphia, consisting of one complete set of tinning pots, with the necessary pickling vats. The plates are to be made 14 x 20 and 28 x 20, or any other sizes required, and the make at present, we are informed, is the N. & G. Taylor Company's Old Style brand. The firm propose to stamp the product with thickness, brand, registered trade-mark and the firm name and address. We are informed that the capacity of the present plant is about 200 boxes per week, and that they are prepared to enlarge their works indefinitely as business warrants. Further, they are now considering the purchase of property where there will be ample room for roll trains and several sets of pots. The plans and specifications for these works, which will contain six complete mills, are already prepared.

Of interest in this connection is the work being done by the Ajax Lead Coating Company, 46 Richmond street, Philadelphia. At present they only do work on order, but they are contemplating making roofing plates for the open market. They are prepared to coat with pure lead sheets of any size, and from No. 16 to 30 gauge. The patented cleaning process involves electrical treatment, the sheets being first placed in a bath and an electrical current passed from the sheets to the lead lining of the vat, with the result, it is claimed, of removing all the magnetic oxide scale. The sheets are then washed and passed through an alkaline bath, then washed again and put in a neutral bath to remove and neutralize the last traces of acid. They are then put in a solution of chloride of zinc and tin, from which they are taken to the drying oven, and then to a bath of pure molten lead. The sheets are drawn out of the bath by machinery and passed through rolls to smooth the surface. The coating pot holds 90,000 pounds of lead; they also have a smaller pot holding 40,000 pounds of lead for coating small work, pipes, &c. Samples of roofing plate which they made by a special process and covered with pure lead have a white surface when new and are about as bright as a tin plate.

A big gun for the monitor Miantonomoh has arrived at the Brooklyn Navy Yard from the Washington foundry. The gun is 30½ feet long and weighs 63,000 pounds. Its projectile weighs 500 pounds and is fired by a charge of 240 pounds of powder. It has a muzzle penetration of 22 inches of wrought iron and of 17½ inches of wrought steel at a distance of one mile. The gun is to be trained and elevated by hydraulic tubes 17 feet long and 12 inches in diameter.

## The Future of Mexico.

Consul-General Sutton speaks most hopefully of the future of Mexico. He considers it an amazing proof of the stability of the nation's finances that there has been neither crisis nor panic during the past 18 months. Bar silver has fluctuated in value from 43 pence to 55 pence in London, and New York exchange from 7 to 40 per cent. premium; yet business has been conducted in an orderly way, notwithstanding these extraordinary changes. The total export of silver from Mexico for the year ending June 30, 1889, was \$38,000,000. The value of this white metal was increased 25 per cent. in August, 1890. If there had been \$400,000,000 invested in Mexican mines, another \$100,000,000 was added to it by the rise of silver and the improvement in exchange. If the imports amounted to \$30,000,000 a year, there was a saving of 25 per cent. in the settlement of accounts. It was a most favorable time for the payment of old debts and for increasing orders for imports. Domestic manufacturers found themselves forced to reduce their selling prices nearly one-quarter, and were menaced with ruin from cheap importations. As the white metal went out of the country under the improved prices in London and New York, there was a scarcity of eagle dollars, and a panic seemed to be impending, but it was averted by the conservative action of the banks. Then followed the decline in silver and the unsettling of all values. These fluctuations have continued from week to week, and have affected every industry, since two-thirds of the exports of Mexico are precious metals, and the purchasing power of all domestic produce is dependent upon the value of white metal. The confusion and uncertainty have been very great, but there has been no crisis. Financial management under President Diaz's administration has steadily improved, and the country's industrial development has not been arrested by the rise and fall of silver, and by the excessive exportations of the past few months.

**The Midvale Steel Company and the Holtzer Process.**—The Midvale Steel Company, at Nicetown, Pa., as we recently stated, have just received a \$1,000,000 contract to supply the Government with gun forgings and armor-piercing projectiles. The company put in a bid for 8, 10 and 12 inch steel gun forgings, also for the same size armor-piercing projectiles. "We have purchased the exclusive right for the manufacture in this country of the projectiles under the Holtzer process," said C. Leon Gumbert, the secretary of the company. "These, while very expensive, are the most successful ever devised. There are now only three establishments in the world able to manufacture these projectiles. They are Jacob Holtzer & Co., Unieux (Loire), France; Pontillon & Co., St. Petersburg, Russia, and the Midvale Steel Company. Jacob Holtzer & Co. are the only firm in Europe who have succeeded in making the 12, 16 and 17 inch guns. Our 12-inch guns weigh 60 tons, and the 17-inch guns weigh 120 tons. A 10-inch shell or projectile weighs 625 pounds without powder. Some of the projectiles are made solid and others are charged with powder. Either will pierce the most invulnerable iron or steel clad vessel. Those charged with powder act with a percussion. They are loaded in 10-inch mortars, which carry a distance of eight miles. The instant they strike the vessel they explode, and the probabilities are that one will do the work." The Midvale company have recently put in a new 50-ton hammer, to be used in making the gun forgings.

## BASIC BESSEMER.

The Only Active American Plant.—  
The Pottstown Iron Company.

Soon after the technical and commercial success of the basic Bessemer process had become an assured success under the conditions prevailing on the Continent of

conjunction with Joseph Hartsborne, now general manager of the plant, and Ernest Bertrand, consulting engineer, plans were drawn up and building operations were begun in June, 1885. The first blow was made on July 1, 1886.

The large tract of land owned by the Pottstown Iron Company was, however, to such an extent covered with the different buildings of the old works that 125 acres were purchased west of the town between

19, from which the steel is transferred to the casting house, along the center of which runs the straight casting pit 14, served by three ingot cranes, 15, and the ingot extractor, 16. Adjoining the casting house is the ladle house, with its crane, 17. The blooming mill adjoins the casting house, the vertical heating furnaces adjoining the latter. Three ingot cranes, 10, handle the ingots from the furnaces and place them on the tables 11. The blooming mill 3, is 36 inch., driven by 40 x 48 inch reversing engines, 4, with shears, 8. A battery of eight boilers, 1, 60-inch return tubular, 24 feet long, containing 56 tubes 4 inches in diameter, furnish the steam and are flanked by three Wellman gas producers. An additional heating furnace with its crane is located near the smith shop, as shown.

The iron is melted in two cupolas, 20, the hoist being placed at 21. The lime hoist is located at 22, the bottom crane at 23, and the bottom oven at 24. A 10-ton open-hearth furnace, originally designed as a melting furnace, is put into an adjoining building, while the pump and engine house contains two 42 x 54 x 48 inch blowing engines, 26, built by the Southwark Foundry and Machine Company of Philadelphia, one Worthington and one Southwark compound duplex pressure pumps, with 9½ inch plungers, 27. The same building contains also two Baker

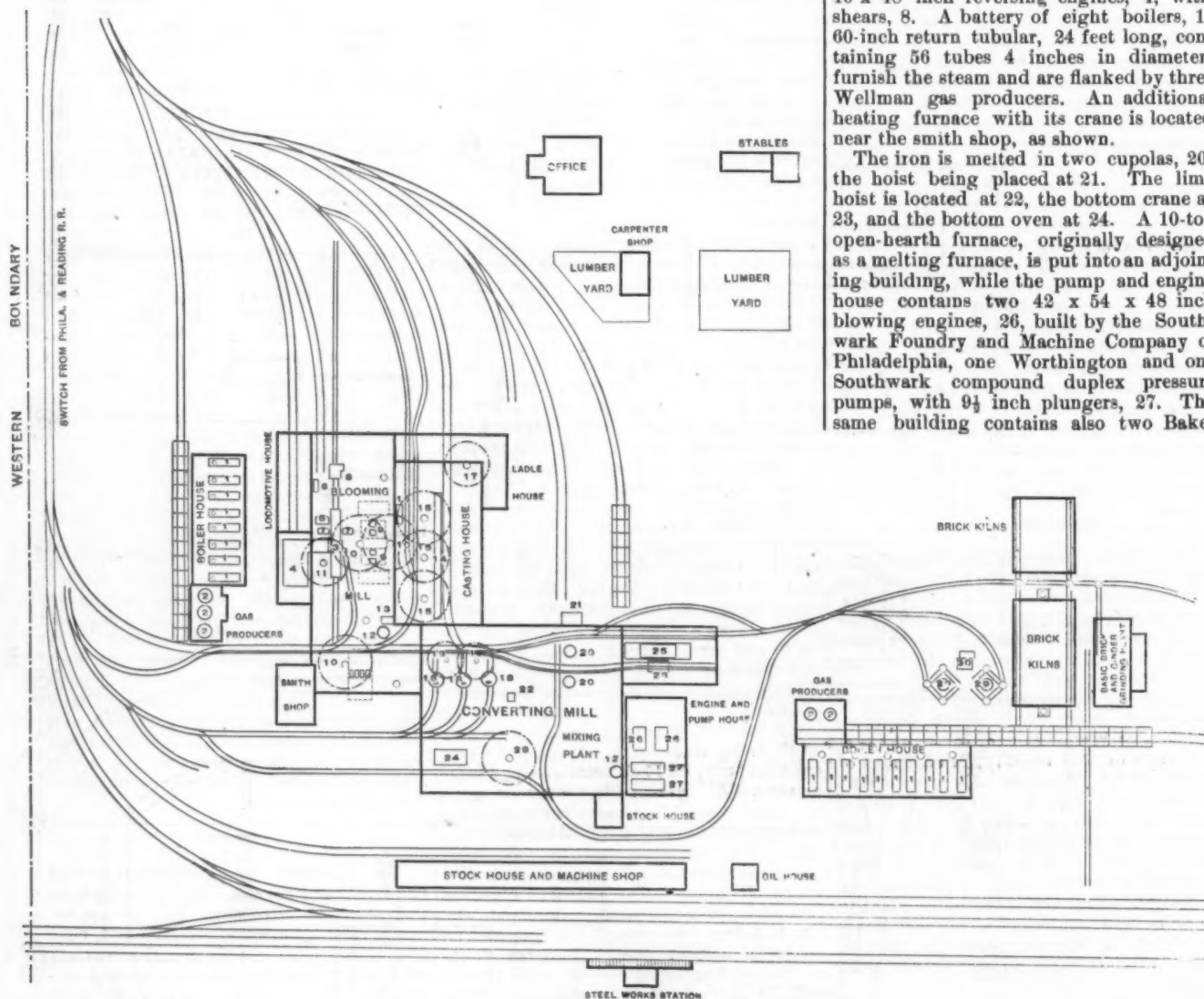


Fig. 1.—General Plan of Basic Bessemer Steel Works, Pottstown Iron Company, Pottstown, Pa.

### INDEX TO FIGS. 2, 5 AND 6.

- |                                 |                             |                                   |                                       |
|---------------------------------|-----------------------------|-----------------------------------|---------------------------------------|
| A. 6 Ton Hydraulic Hoist.       | N. Lime Heating Furnaces.   | Z. Drying Oven for Flat Bottoms.  | NN. 17 x 24 Inch Steam Engine.        |
| B. 10 Foot Iron Cupolas.        | O. 4 Ton Hydraulic Hoist.   | AA. Drying Oven for Plug Bottoms. | OO. 9 x 18 Inch Steam Engine.         |
| C. 7 Foot Dolomite Cupola.      | P. 4 Ton Hydraulic Crane.   | BB. 15 x 30 Inch Steam Engine.    | PP. Dynamo Machine                    |
| D. Proposed Additional Cupolas. | Q. Water Backs.             | CC. Dolomite Sifter.              | QQ. 4½ x 48 Inch Blowing Engines;     |
| E. Hot Metal Scales.            | R. Hydraulic Filters.       | DD. First Dolomite Crusher.       | 54 Inch Air Cylinder.                 |
| F. 20 Ton Hydraulic Hoist.      | S. Pulpit for Vessels.      | EE. Second Dolomite Crusher.      | RR. 9½ x 36 Inch Compound Pump;       |
| G. 10 Ton Open Hearth Furnace.  | T. Locomotive Ladle Crane.  | FF. Mixing Machine.               | Steam Cyl. 21 x 36 Inch.              |
| H. Reversing Valves.            | U. Casting Pit.             | GG. Tar Boiler.                   | SS. 9½ x 16 Inch Porter-Alien Engine. |
| I. Smoke Stack.                 | V. 10 Ton Hydraulic Crane.  | HH. Mortar Mill.                  | TT. Centrifugal Pump; 7000 Galls.     |
| K. 15 Ton Ladle Crane.          | W. Pulpit for Ingot Cranes. | II. Accumulator.                  | per Minute.                           |
| L. 10 Ton Converter.            | X. Cinder Pits.             | MM. Baker Blowers.                | UU. Ladle Cars.                       |
| M. Ferromanganese Furnace.      | Y. Stopper Oven.            |                                   |                                       |

Europe the Pennsylvania Steel Company experimented with it on a large scale, but soon abandoned it. The result was that in the Eastern iron trade the conviction became general that the conditions were unfavorable to it in this country. During a visit to Europe William H. Morris, president of the Pottstown Iron Company of Pottstown, Pa., a leading firm of iron manufacturers in Eastern Pennsylvania, reached the conclusion that basic Bessemer steel would furnish material exceptionally well suited for plates and nails, the principal product of the works. After a thorough study of the subject abroad, in

the tracks of the Philadelphia and Reading Railroad and the Pennsylvania Railroad, in close proximity to the Schuylkill River, thus securing ample transportation facilities and water. In the general plan, Fig. 1, the "Steel Works" station is on the Pennsylvania Railroad, whose tracks skirt the river, while along the Western boundary lies the main switch from the Philadelphia and Reading Railroad, whose station is called "Stowe."

The plant consists of three basic Bessemer converters, 18, Fig. 1, of which two are nominally 10-ton and one 12-ton capacity. They are served by two cranes,

blowers, the electric light plant, a centrifugal pump for the general water supply and the pumps for mill service water. Steam is generated in the boiler house, containing a battery of ten return tubular boiler similar to those at the blooming mill, flanked by two Wellman producers for the open hearth. Beyond are placed the two lime kilns, 29, with their hoist, 30, and the basic brick kilns, basic brick and slag-grinding plant.

The general system of tracks of the works will be fully understood from the drawings. We may turn now to the details of



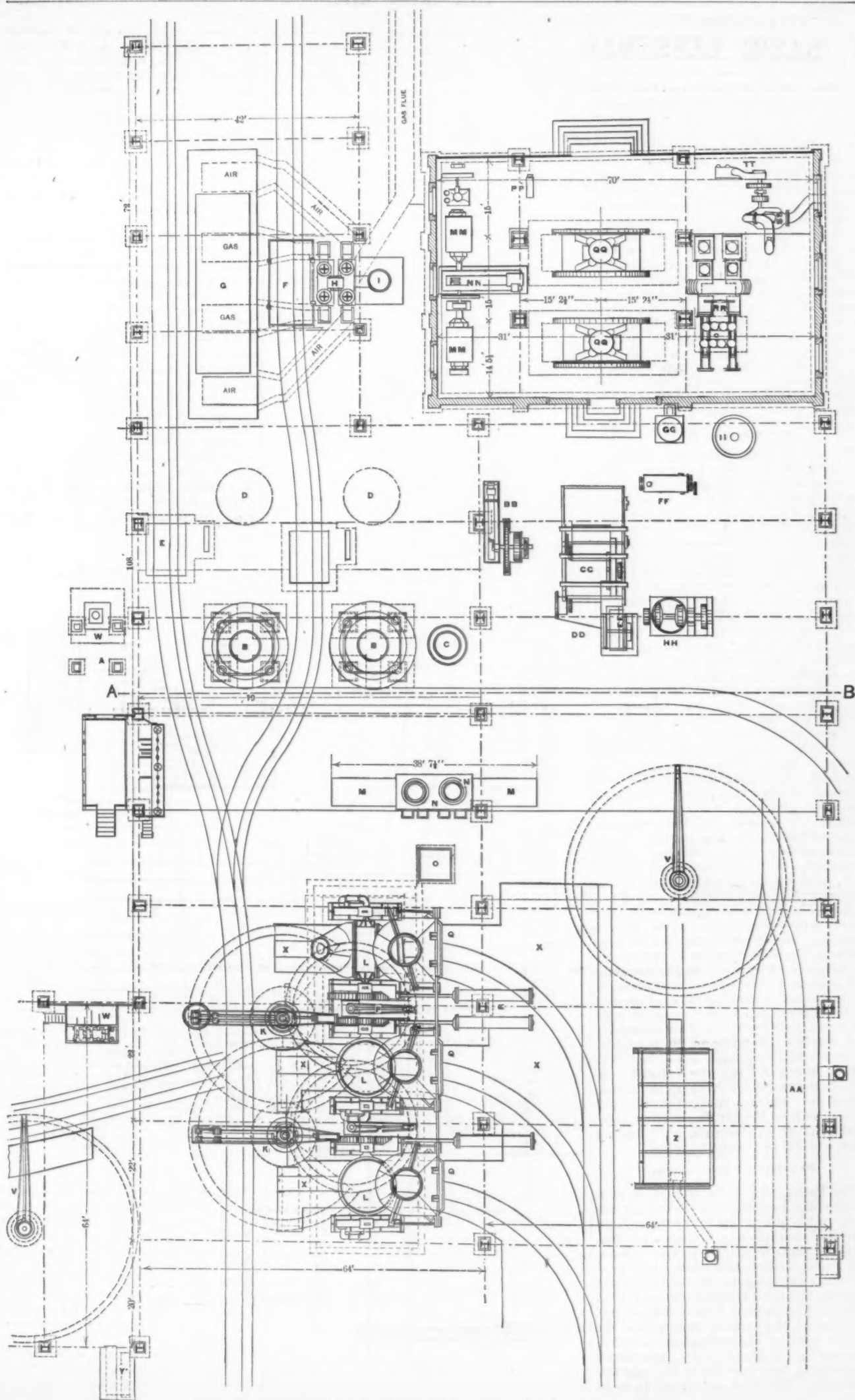


Fig 2—Converting Mill, Pottstown Iron Company's Basic Bessemer Plant.

**The Converting Mill,**

referring throughout to Fig. 2. A is a 6-ton hydraulic hoist for the two 10-foot iron cupolas BB, near which is placed the 7-foot dolomite cupola C, room being left for two additional iron cupolas at D. The iron is handled by the two 15-ton ladle cranes K, which swing through an area of  $270^\circ$  and have an effective swing of 16 feet. The three converters L are controlled also by two cranes, P, with an effective swing of 11 feet, which are used for charging the lime additions. The converters are handled by hydraulic racks, R, the pulpit being located near A. QQ are water backs and XX are the cinder pits; M is the ferromanganese furnace, NN are the lime-heating furnaces, O the 4-ton lime hoist; VV are 10-ton hydraulic cranes; W is the pulpit for the ingot cranes; Z the 13 foot 10 inch by 25 foot drying oven for flat bottoms, and AA the drying oven for plug bottoms. Figs. 5 and 6, being sections through the converter house and through the cupola house, merely indicate the position of the different parts of the plant.

**The Blooming Mill.**

The size of our drawings makes it necessary to divide the plan of the blooming mill into two parts, Figs. 3 and 4. Their relative position is indicated by the repetition on Fig. 3 of parts in Fig. 4, like AA, R and M. The location of this, the casting house and the blooming mill, with reference to the converting mill, is clearly shown in Fig. 1. The ingots from the straight casting pit are handled by a series of three cranes, L, the valves for working them being located at M. The ingots are transferred by cranes to two 2-pit vertical regenerative heating furnaces, each pit having a capacity of four to six ingots. Our drawings show different sections of these heating furnaces, C being the air regenerators and D the gas regenerators, with the gas valves located at E and the air valves at F. The gas main is shown at K. Another part of the plan shows the heating furnace with the checker work taken off, a second the floor with the plates removed, showing the beams, and the third the floor plates themselves. H is the stack of the furnace. On the other side of the mill, at 10, Fig. 1, is another vertical heating furnace, whose four pits are all connected. An ingot extractor is located at N, with its pump, O. At I there is a stopper drying oven, at G a drying floor. From the heating pits the ingots are conveyed by the crane system to the 36-inch blooming mill, whose rolls are P, with tables Q, ingot manipulator R, and engines working the tables S. T are the blooming mill pinions, U the 10-ton hand crane, V the platform for working the engines, and W the engines themselves, being 40 x 48 reversing, built by the Southwark Foundry and Machine Company of Philadelphia. X are 6 x 12 feed pumps, Y a 42 inch Berryman heater, Z being the exhaust. At AA are the valves for working the tables, BB is the delivery table, CC the hot shears, built by Morgan Engineering Company of Alliance, Ohio; DD is the loading track and EE the locomotive shed.

**Practice at Pottstown.**

The Pottstown Iron Company have been particularly successful in producing for their own requirements in the basic Bessemer mill at their own furnace a pig iron meeting them well. From Lake Champlain and Jersey magnetites and local hematites the company are making an iron carrying about 0.2 to 0.4 of silicon, 2.60 to 2.80 of phosphorus, 0.02 to 0.04 of sulphur, and 1.30 to 1.60 of manganese. The greater part of the manganese is lost in the cupola. It is, of course, introduced into the pig iron in order to keep the sulphur low. The blow lasts from 10 to 11

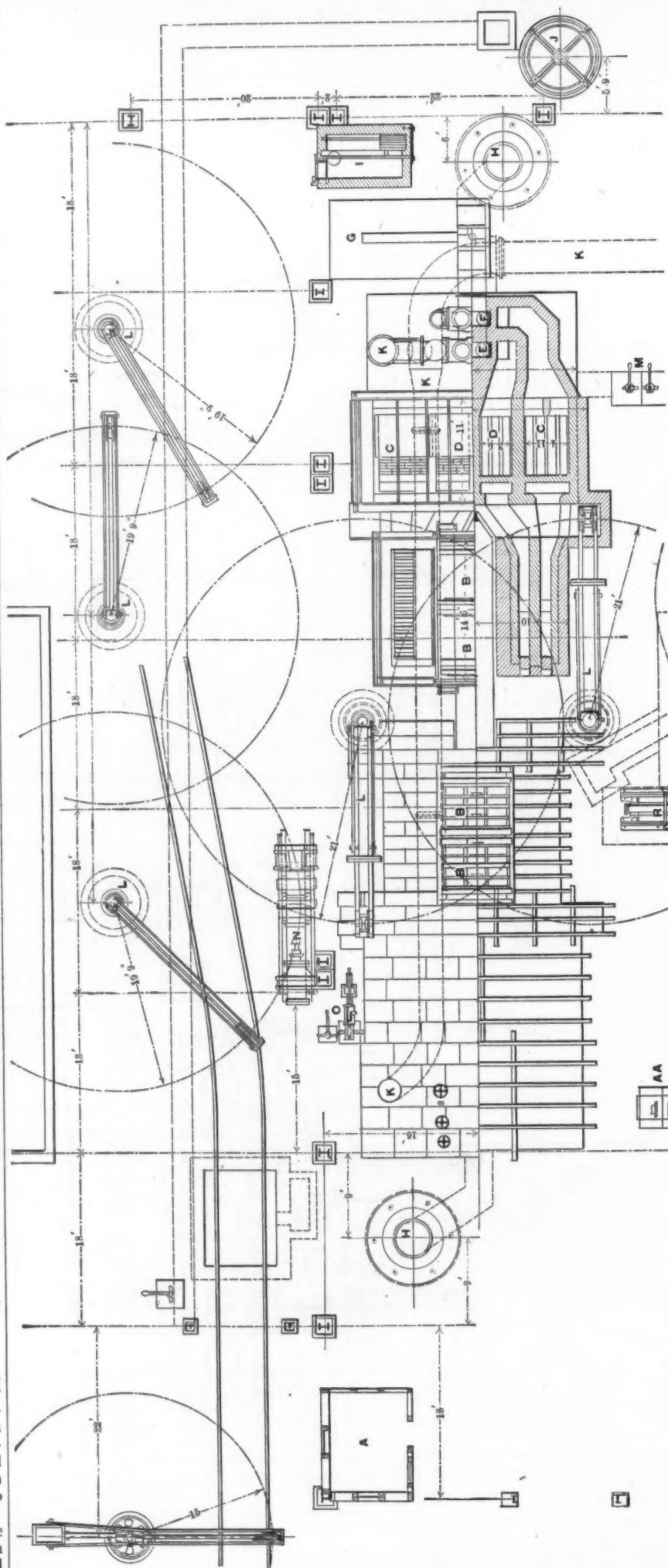


Fig. 3.—Casting House, Pottstown Iron Company's Basic Bessemer Plant.



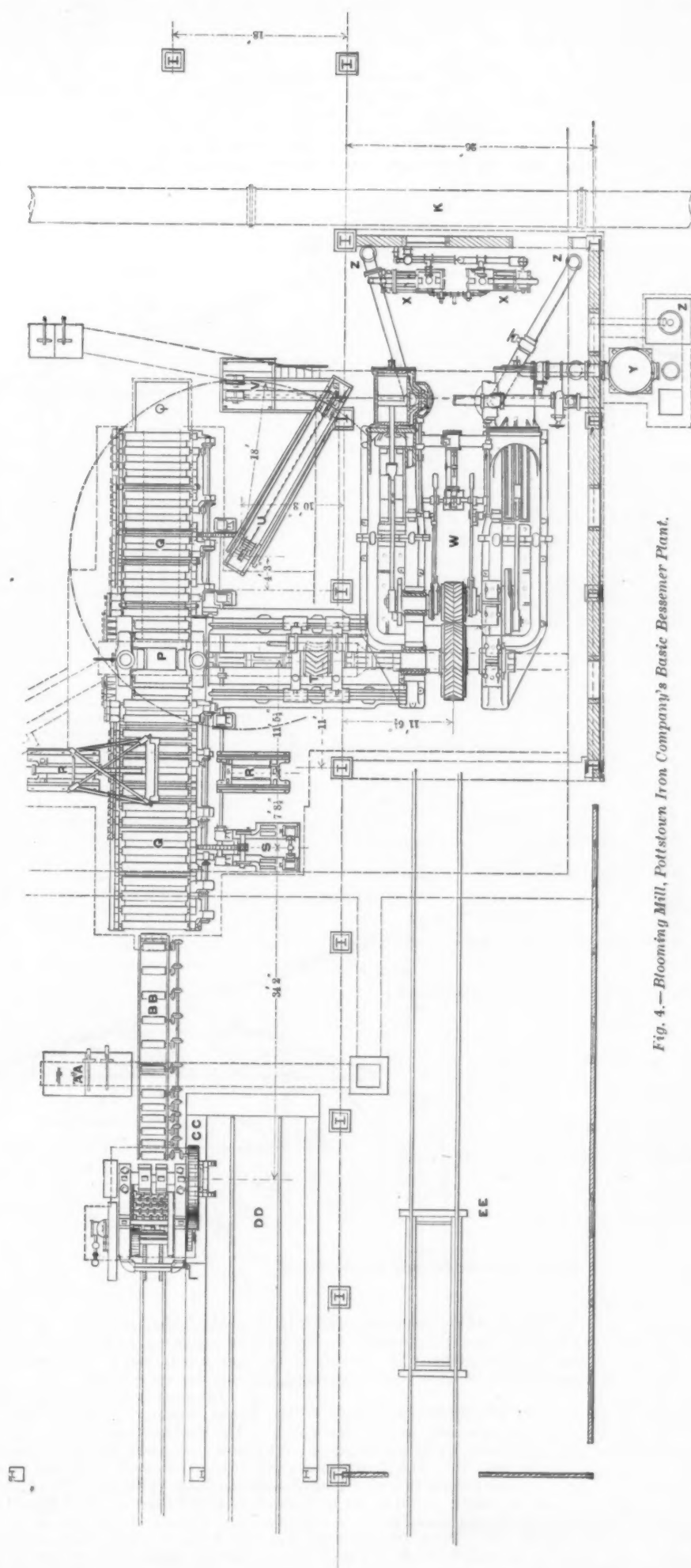


Fig. 4. - Blooming Mill, Pottstown Iron Company's Basic Bessemer Plant.

## INDEX TO FIGS. 3 AND 4.

- |                        |                             |                                     |                                  |                                    |                                 |                            |
|------------------------|-----------------------------|-------------------------------------|----------------------------------|------------------------------------|---------------------------------|----------------------------|
| A. Office              | G. Drying Floor.            | M. Valves Working Hydraulic Cranes. | Q. 36 Inch Blooming Mill Tables. | U. 10 Ton Hand Crane.              | X. 6 Inch x 12 Inch Feed Pumps. | AA. Valves Working Tables. |
| B. Reheating Furnaces. | H. Smoke Stacks.            | N. Ingot Extractor.                 | R. Ingot Manipulators.           | V. Platform for Working Engines.   | Y. 42 Inch Heater.              | BB. Deltay Tables          |
| C. Air Regenerators.   | I. Stopper Drying Oven.     | O. Pump Working tractor.            | S. Engines Working Tables.       | W. 40 x 48 Inch Reversing Engines. | Z. Steam Exhausts.              | CC. Hot Shears.            |
| D. Gas Regenerators.   | J. Accumulator.             | P. 38 In. Bloom'g Mill Rolls.       | T. Blooming Mill Pinions.        |                                    |                                 | DD. Loading Track.         |
| E. Gas Valves.         | K. Gas Main.                |                                     |                                  |                                    |                                 | EE. Locomotive Shed.       |
| F. Air Valves.         | L. 10 Ton Hydraulic Cranes. |                                     |                                  |                                    |                                 |                            |

minutes, the after blow taking from 4 to 5 minutes, the charge of calcined lime being from 11 to 13½ per cent. With its low silicon contents the iron naturally requires a high initial temperature for blowing, and it is, therefore, melted very hot. The cinder is run off from the ladle into a car placed below the converter and running in the pit X, Fig. 2. The converters are blown to a pressure of 25 to 28 pounds, the life of the lining fluctuating between 100 and 140 blows. At the time of the visit of the representative of *The Iron Age* the

soft steel. The ferro is charged into the vessel by means of a spoon. The number of blows made per week fluctuates between 100 and 120, single turn, so that the capacity of the plant running on dead soft steel may be rated at 50,000 tons annually, single turn.

It is a fact which indicates how careful is the practice at the basic plant that the number of miss-blows—that is, blows containing over 0.10 of phosphorus—constitute only 1 per cent. of the number. For a long time the Pottstown Iron Company

broken in the same way. With dead soft steel it takes two to four blows in one direction. Another part of the ingot is forged down to ½ inch square, careful attention being given to keeping the temperature uniform in the tests, so as to secure identity of conditions. One ½-inch bar is chilled and nicked to show the fracture and is bent double under the hammer. The other ½ inch bar is allowed to cool and then doubled up. From these tests and the character of the fracture the manager classifies the metal, the custom at the

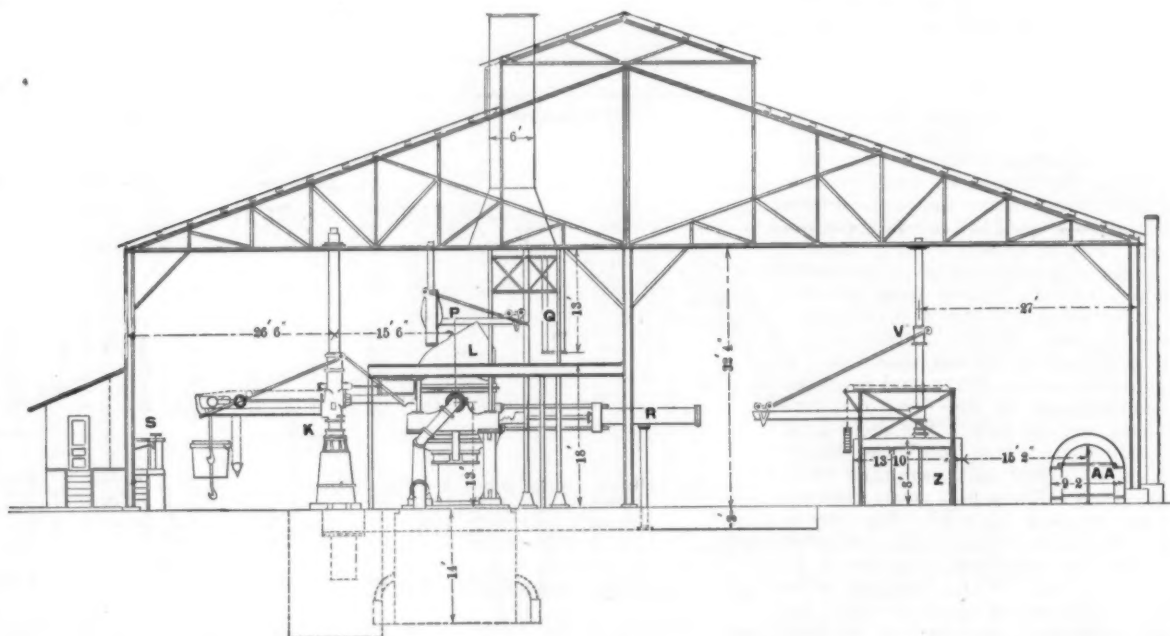


Fig. 5.—Section through Converting Mill.

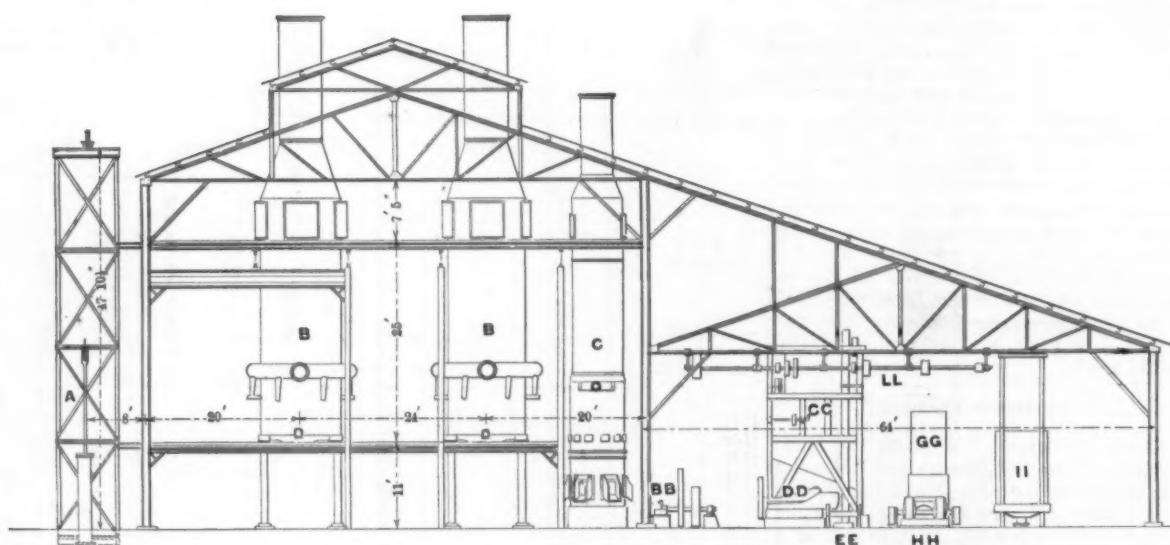


Fig. 6.—Section through Cupola House.

bottoms of the three converters then in operation had carried, the one 206, the other 274 and the third 475 blows. So far as the latter is concerned the record is not quite clear, but the figure given is an inside one. The bottoms themselves are carefully patched at frequent intervals. After each "blow" the short tuyeres are knocked out from the nose, new ones put in and the bottom built up by means of a slurry of dolomite and tar. The preparation of the material for the basic lining will be treated later on. The waste amounts to about 13 to 15 per cent. The recarbonizing is done with 1.6 per cent. of spiegel charged into the ladle and one-half of 1 per cent. of 80 per cent. ferro for

have not had a blow containing over 0.12 of phosphorus and the average for the last three months is 0.04. The quality of the steel is watched closely and is checked by

#### A Very Elaborate System of Tests

made from a 4-inch ingot, which is cast from each blow. This is hammered out to a 1½-inch bar, from which two pieces are cut. One is chilled in water, nicked and broken, the smith marking the number of blows of the 800-pound hammer needed to break the bar. With soft steel the usual number of blows is from five to six in one direction and one to two in the other direction. The second piece of 1½-inch steel is allowed to cool in the open air and is then

works being to follow the Tunner scale, interpolating, however, between each number a soft and a hard, so that in all 21 numbers are reached.

The most instructive test made with the steel, however, is the so-called "ear test." The steel is drawn down under the hammer and flattened to ¼ inch, the width being 1½ inches. The end is then slitted for about 1½ inches. Two ¼ inch holes are punched through the flattened part of the test piece, and then the slit is opened out and the two ears thus formed are partly turned back. The two holes are drifted out to a diameter of 1½ inches, and finally the two ears are turned back completely. No cracks or checks should appear, and if



the side of the metal near the drifted holes is perfectly smooth its quality is designated as FF. The slightest indication of red shortness reveals itself, by cracks or checks and a serious amount by the breaking off of the ears. The entire test is carried through at a cherry heat, which is kept as uniform as possible, and an effort is made to conduct it so that it is completed in two heats. Besides these tests each heat is analyzed for carbon, sulphur, phosphorus and manganese.

The quality of the steel produced is certainly exceptionally good, phosphorus having been forced down as low as 0.008, though it usually fluctuates between 0.02 and 0.05. From the different physical tests alluded to the manager makes a guess at the phosphorus, manganese and sulphur contents of the steel, which are recorded, and an examination of these guesses compared with the returns by analyses show how surprisingly closely the physical tests permit of judging of the chemical composition. The greater part of the product of the works is a dead soft steel, the purity of which may be judged from the fact that metal running as low as 0.15 in manganese has been rolled in ordinary course without betraying any red shortness. A considerable portion of the steel produced is manufactured by the Pottstown Iron Company into cut nails. The check upon the quality here is that from every keg of nails made several nails have their heads flattened out sidewise on a steam hammer and are doubled up cold. The greater part of the balance of the product is rolled into plate for structural purposes in the fine universal mill of the company, while another part is rolled into boiler shell and flange plates in the plate mill of the company. Punchings from these plates hammer down cold to thin disks without checks on the edge. The company sell also slabs and billets, the former up to a width of 34 inches and a thickness of 9 inches, and the latter from 4 to 9 inches square. It is a somewhat curious fact that following the prejudice against basic Bessemer first developed in England, our own navy is opposed to the use of this material for naval structure. Considering the fact that the product of the basic Bessemer converter is a far purer metal than that cast from the acid converter, this prejudice must soon give way to the achievements of modern metallurgical work. We present below the physical tests and the chemical analyses of a series of plates manufactured from basic Bessemer steel by the Pottstown Iron Company, the examples being chosen as typical of the quality made.

#### The Basic Lining.

The fact was soon realized by the management of the Pottstown Iron Company that the success of the process depended upon a thorough preparation of the basic lining. The dolomite is crushed in a Gates crusher, ground in a mortar mill, carefully screened, and briquetted in a brick machine, about 2 per cent. of basic cinder being added to the dolomite in accordance with the patents secured by the company. These bricks are calcined at a high temperature in a series of eight kilns, taking each 5000 to 6000 bricks, and requiring a heat of 96 hours. This burning causes the brick to shrink about 50 per cent. in size and weight. This brick is again coarsely ground in a Gates crusher, DD, Fig. 2, screened in CC, and, if necessary, again ground in a mortar mill HH. It then goes to the mixing machine FF, where it is mixed with about 10 per cent. of tar previously boiled at as high a temperature as is necessary to drive off all of the water. The lime for the additions is chosen as low in silica as it is obtainable and is calcined in the kilns shown at 29, Fig. 1.

Blow number.	Analyses.			Tests.				Used for.	Thickness of test piece.
	C.	P.	Mn.	Elastic limit.	Ultimate strength.	Elongation.	Reduction.		
1236.....	0.07	0.025	0.303	£2,880	51,040	27.25	65.6	F. B.	Inch. 5-16
1365.....	0.10	0.03	0.480	33,070	53,010	25.75	52.2	F. B.	3/4
1423.....	0.09	0.035	0.494	32,370	56,290	32.5	62.9	F. B.	3/4
1764.....	0.10	0.035	0.414	35,750	59,670	27.5	62.9	B.	3/4
1297.....	0.09	0.055	0.370	34,160	60,880	27.0	61.9	S. S.	3/4
1532.....	0.10	0.05	0.480	37,460	60,950	27.5	63.8	S. S.	3/4
911.....	0.12	0.03	0.515	44,000	66,900	25.5	60.7	F.	No. 1 American gauge.
856.....	0.14	0.055	0.511	38,350	73,290	22.0	53.2	B. No. 1	9-16
866.....	0.14	0.035	0.509	41,800	71,600	23.25	43.4	B. No. 1	3/4
873.....	0.14	0.035	0.399	41,600	70,100	25.5	57.8	B. No. 1	3/4

S. S.—Soft Shell.

B. No. 1.—Universal Bridge.

January 29, 1891.

Blow number.	Analyses.				Tests.						Used for.	Thickness of test piece.
	C.	S.	P.	Mn.	Ear test.	Grade.	Elastic limit.	Ultimate strength.	Elongation. Per cent.	Reduction. Per cent.		
1048.....	0.07	0.012	0.019	0.300	ff	6s	42,940	57,690	26.75	70.2	F. B.	Inch. 5-16
1049.....	0.09	.....	0.065	0.358	ff	6h	39,410	65,600	24.25	65.6	B.	3/4
1050.....	0.12	.....	0.025	0.064	ff	6s	31,730	52,490	30.0	72.4	B.	3/4
1051.....	0.09	.....	0.025	0.413	ff	6s	31,730	52,490	30.0	72.4	B.	No. 2 American gauge.
1052.....	0.08	0.029	0.025	0.403	ff	7s	31,700	52,400	30.0	76.7	F. B.	3/4
1053.....	0.09	.....	0.030	0.426	ff	7h	30,730	54,730	33.5	69.5	S. B.	3/4
1054.....	0.09	0.026	0.013	0.506	.....	.....	.....	53,100	46.0	68.9	F. B.	3/4
1055.....	0.10	0.031	0.03	0.348	ff	7s	.....	.....	.....	.....	F.	.....
1056.....	0.08	0.029	0.045	0.313	f	7s	.....	.....	.....	.....	F.	.....
1057.....	0.10	.....	0.025	0.325	.....	.....	31,800	51,540	30.0	74.0	F. B.	7-16
1058.....	0.08	.....	0.035	0.406	ff	7s	35,330	59,740	26.5	61.7	F.	7-16
1059.....	0.09	.....	0.025	0.319	f	7—	.....	52,060	45.0	73.7	F.	3/4
1060.....	0.11	.....	0.045	0.371	ff	7—	38,090	63,810	25.0	61.6	F.	5-16

F. B.—Fire Box.

B.—Bridge.

F.—Flange.

S. B.—Soft Bridge.

April 7, 1891.

Blow number.	Analyses.				Tests.						Used for.	Thickness of test piece.
	C.	S.	P.	Mn.	Ear test.	Grade.	Elastic limit.	Ultimate strength.	Elongation.	Reduction.		
1541.....	0.11	.....	0.03	0.300	ff	7s	.....	.....	.....	.....	N.	Inch. 7-16
1542.....	0.08	.....	0.03	0.401	f-ff	7s	.....	.....	.....	.....	N.	.....
1543.....	0.09	.....	0.035	0.526	f-ff	7-7s	46,180	69,090	25.25	56.6	B.	3/4
1544.....	0.12	.....	0.03	0.395	ff	6s	.....	73,410	32.5	52.0	B.	.....
1545.....	0.10	.....	0.045	0.566	ff	7h	.....	.....	.....	.....	F.	.....
1546.....	0.10	.....	0.03	0.494	ff	7s	.....	.....	.....	.....	F.	.....
1547.....	0.11	.....	0.03	0.500	ff	7-7s	.....	.....	.....	.....	F.	.....
1548.....	0.13	.....	0.04	0.446	ff	5s	.....	.....	.....	.....	B.	.....
1549.....	0.10	.....	0.04	0.500	ff	7s	.....	.....	.....	.....	S.	.....
1550.....	0.09	.....	0.08	0.365	ff	6s	.....	.....	.....	.....	S.	.....
1551.....	0.10	.....	0.035	0.579	.....	.....	39,790	58,130	26.0	67.8	F.	3/4
1552.....	0.08	.....	0.055	0.480	ff	7h	.....	.....	.....	.....	S.	.....
1553.....	0.07	.....	0.03	0.454	ff	7s	42,990	57,980	24.25	70.0	F. B.	5-16
1554.....	0.07	.....	0.045	0.467	f	7ss	.....	.....	.....	.....	F.	.....
1555.....	0.12	.....	0.030	0.434	.....	.....	.....	.....	.....	.....	S.	.....
1556.....	0.07	.....	0.055	0.415	f-ff	7s	.....	.....	.....	.....	N.	.....
1557.....	0.07	.....	0.030	0.392	.....	.....	.....	.....	.....	.....	F. B.	.....
1558.....	0.07	.....	0.035	0.457	ff	7s	.....	.....	.....	.....	F.	.....
1559.....	0.08	.....	0.04	0.250	ff	7s	.....	.....	.....	.....	N.	.....

N.—Nails.

B. Bridge.

F. B.—Fire Box.

#### The Slag

is ground in a special plant, to be prepared for the market. The following is a typical analysis of the slag made.

	Per cent.
Phosphoric acid.....	21.37
Silica.....	5.10
Magnesia.....	5.90

Alumina.....	4.01
Manganese oxide.....	5.56
Oxide of iron.....	12.00
Soda and potash.....	0.80
Lime.....	45.26

Total.....100.00

The principal point to be carefully considered in the treatment of the slag is to

reduce it to an almost impalpable powder. At the grinding works of the Pottstown Iron Company the material is ground so fine that 80 to 90 per cent. passes through a 100-mesh screen, and 60 to 75 per cent. through a 150-mesh screen. The Pottstown Iron Company sell the slag as fertilizer, with a guarantee of 20 per cent. phosphoric acid contents. They also put up the slag in 5-pound packages for the use of amateur gardeners and sell the same as a bug destroyer.

#### The Western Gas Association.

The fourteenth annual meeting of the Western Gas Association was held at the Galt House, Louisville, Ky., on the 20th and 21st insts. There was a large attendance of officers and superintendents of gas companies, not only from all over the West but from many parts of the Eastern States, and the proceedings are regarded by the gas fraternity as of the highest interest. Frederic Egner of St. Louis, president of the association, delivered a masterly address at the opening of the convention, presenting many live questions for consideration. A. W. Littlefield, of Quincy, Ill., is the efficient secretary. The members took a lively interest in the proceedings, presenting a number of technical papers, which were not only read but very thoroughly discussed. The gas question, however, was treated almost entirely from the standpoint of its use for illuminating purposes, and those who were seeking information with regard to the progress being made in its use for fuel were to some extent disappointed. Much attention was given to the subject of electric light competition, and the consensus of opinion appears to be that gas had been able to hold its own as an illuminant. Stress was placed upon the point, which it was claimed had now been established, that electric light could not be furnished to the consumer at as low cost as gas, with the improvements in processes made in recent years in the production of the latter. It was boldly asserted that electric light companies were, as a rule, conducting unprofitable enterprises.

A pleasing feature of the meeting was the freedom with which the members imparted the most minute information concerning the results of experiments which they had tried or of new or improved methods which they had introduced in their works. The conclusion of the reading of a paper was the signal for a merciless avalanche of questions to the reader, covering all points which seemed to be imperfectly treated or upon which there might be a conflict of opinion. An interchange of ideas followed, which could not do otherwise than result in benefit.

Interesting action was taken on the subject of a standard ton for the association. President Egner, in his address, recommended that the gross ton of 2240 pounds be abandoned and that the net ton of 2000 pounds be hereafter considered the standard. He argued that as all the Western railroads charged freight on the 2000 pounds basis, and their raw materials were largely bought by the net ton, that the use of the gross ton was antiquated and led to many inconvenient computations which would be avoided by the uniform use of the net ton. The association were of his opinion and sustained his views by a large majority. Detroit was selected as the place of meeting next year.

The following officers were elected for 1892: President, E. G. Cowdery of Milwaukee; first vice-president, Byron E. Chollar of St. Louis; second vice-president, E. H. Jenkins of Columbus, Ga.; secretary and treasurer, A. W. Littleton of Quincy, Ill.; directors, Wm. H. Odiorne, Springfield, Ill.; K. M. Muchell, St. Joseph, Mo.; I. C. Baxter, Detroit; I. S. Post,

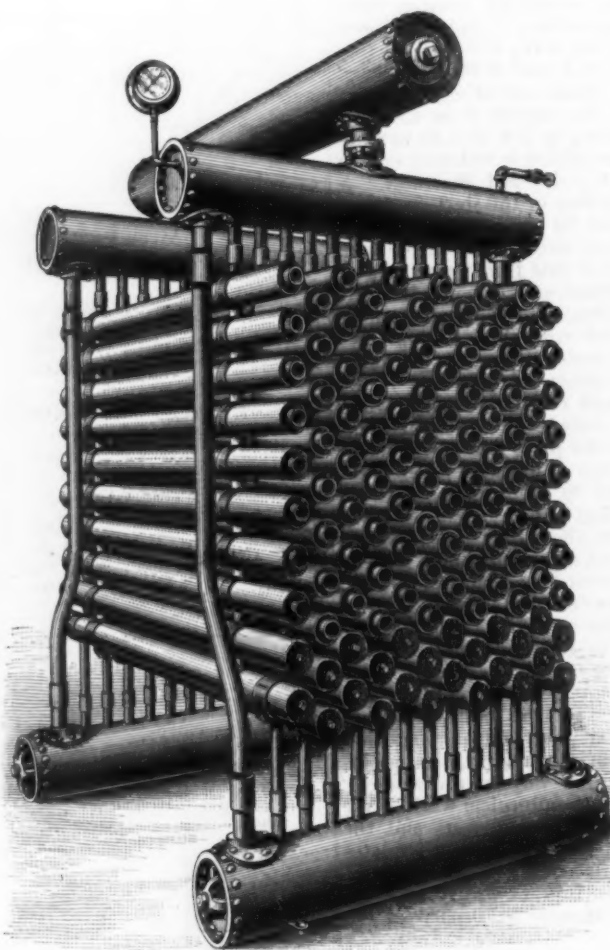
Chattanooga; Jerome Penn, Washington Court House, Ohio; William Wallace, Lafayette, Ind.; A. H. Barret, Louisville; Alten S. Miller, Omaha, and W. J. Johnston, Fort Smith, Ark. The meeting adjourned on the afternoon of the 21st inst. after accepting an invitation by the Louisville Gas Light Company and Dennis Long & Co. to visit the Mammoth Cave on Friday and Saturday by special train.

#### The Ruble Boiler.

This boiler, which is made by Martin R. Ruble of 528 Broad street, Newark, N. J., is formed of tubes and flues connected in such a manner as to form steam-tight joints between them and to avoid expansion of the ends of the tubes. Shrunk on

of nipples. By this construction the tubes are strengthened around the openings for the nipples, and larger screw-threaded surfaces are provided for. By this arrangement the tubes are united in vertical rows. The products of combustion pass up between the tubes, and at the top are deflected to pass down at one end of the flues, then through the flues to the stack. It will be observed that the water tubes are subjected to a double action, interiorly and exteriorly, so that the boiler is a quick steamer and economical in the use of fuel.

Prof. Robert T. Hill, State Geologist of Texas, has made a scientific investigation of the underground water supply, and under the auspices of the Government has extended his field of observation through



THE RUBLE COMBINED PIPE AND TUBULAR BOILER.

the tubes are bands, which provide increased surfaces for the connection of nipples, whereby steam-tight joints are produced at the places of union of the nipples and tubes. The construction and general arrangement of the boiler will be understood from the engraving. Above the upper tier of flues and tubes and connected with the latter are steam drums, while below the lower tier are mud drums, which are similarly connected. The mud drums are also connected at each end with the steam drums by vertical tubes. The products of combustion pass through the flues which are connected with the tubes, in which they are centrally placed, by means of caps having central openings, through which the ends of the flues are passed. Fitted on the projecting ends of the flues are nuts, which are tightened against the contiguous ends of the caps, thereby firmly uniting the tubes and flues and making steam-tight joints. Shrunk on each tube near each end is a band, formed with openings to receive the ends

the Southwest with encouraging results. He says: "This is the artesian epoch in Texas. Nearly all the cities—Galveston, Houston, Austin, Dallas, Waco, San Antonio, Abilene, Temple, Belton, Paris and El Paso—are boring wells. Drill derricks are becoming as common in Texas as in the oil regions of Pennsylvania. Some magnificent flows are being obtained. Artesian wells have reduced the cost of water supply to a minimum in several Texas cities. Some novel uses for artesian water have been developed. In Waco dozens of small industries are being operated by water power from artesian wells. Among them are wood-working machines, circular saws and planing mills. A clothing factory is running several hundred sewing machines with artesian power, costing practically nothing."

Over 20,000 Italians, bound to the United States, passed Gibraltar in the last four months in 31 steamers. South America is no longer a preferred destination.



## RAPID BESSEMER WORK.

### A Discussion of the Advantages and Drawbacks of Rapid Driving.

The last volume of the "Transactions of the Iron and Steel Institute," contains the following interesting letter discussion, not yet published in this country:

#### E. C. Potter's Views.

While I believe that the general average of American Bessemer pig iron, as delivered to the converter, is lower in silicon than the established European practice, yet it seems to me that Mr. Howe has given undue prominence to practice which used pig iron exceptionally low in silicon, thereby unintentionally misleading his readers as to the usual and average American practice. Even the practice which he cites, of using iron with silicon considerably below 1 per cent., is not the ordinary or average practice at the works in question. If I translate Mr. Howe's cipher names of works correctly—and in this particular case I believe I do—the use of iron as low in silicon as stated is, I believe, largely confined to those occasions of "beating the record" for which these works have achieved considerable notoriety. For those occasions, in order to attain the greatest possible speed, a sufficient quantity of low-silicon iron is selected out of stock and reserved for this great effort, which extends over periods varying from a week to a month. In this case, certainly, many consecutive heats, and even many consecutive days, of very low silicon practice may be obtained. But when the record has been sufficiently broken a return to the ordinary stock of iron is necessary, the average of which is considerably higher in silicon because of the withdrawal of all the low-silicon iron. I have known of these works being compelled to run largely on iron carrying 3 to 4 per cent. of silicon after a month spent in "record breaking." Their average, therefore, is no lower than the rest of the country, which I should place at 1.75 per cent. to 2 per cent. of silicon. It is impossible for any works, or any group of works, to run continuously on iron below 1 per cent. in silicon, simply because it is impossible for any blast furnace to make this character of iron regularly and uniformly, and of sufficient purity, especially as regards sulphur, for steel making. I would not be construed as condemning the use of low-silicon iron, or controverting Mr. Howe in his general deductions. I merely desire to correct what seems to me to be an unintentionally misleading impression to the readers of his admirable paper, that the usual or typical American practice is the use of this very low silicon iron.

Upon one point, however, I must squarely take issue with Mr. Howe—namely, on the question of rapid running as affecting quality. Upon the general proposition that of two plants of equal size, one American, the other European, the former will yield a considerably larger tonnage than the latter, and in that respect is a "rapid" plant, I am firmly of the opinion with Mr. Howe that our quality does not suffer with the larger output, for reasons clearly set forth in the paper under discussion. But when a plant which, for example, would make 700 tons per day in Europe, or 1000 tons per day in America, is forced in America to make 1200, 1400 or even 1500 tons per day, I insist that the result as regards quality is unsatisfactory, not to say disastrous. I am speaking now of that strictly American practice of "beating the record." The utter recklessness with which operations are carried on on these occasions is sufficient proof that

the results must be bad—and they are bad. I never knew of a record broken in which the record for high percentage of second quality was not also broken. The desire for tonnage, tonnage, nothing but tonnage, by both manager and men, leads to slovenly, careless work. In the mad struggle for supremacy everything goes with a rush—scrapping carelessly done; blowing more or less inaccurate; heats poured hurriedly and in a slovenly manner; nozzles in ladles badly set and imperfect streams resulting; molds carelessly and irregularly set in their tools, causing large "fins" on the bottoms of ingots; molds insufficiently cooled, and ingots stripped too soon. Any or all of these deficiencies would seriously impair the quality of the product. Then, when the rail mill is reached, we find the steel either insufficiently heated or scorched; the rolls are not changed as soon or as often as they should be; saws are allowed to run until dull, resulting in rough and inaccurate cutting; rails are straightened so hot that they cannot be handled without hand-leathers, consequently they continue to warp after they have left the mill, reaching the purchaser's hands in bad condition and often unfit to lay in track. It is in the finishing department of the mill that the sins of "beating the record" are most largely developed. A hot-bed designed to deal with 1500 rails per shift cannot well deal with 2000 rails per shift with equal care. There are two ways of meeting the emergency of a heavy surplus of rails on the hot-bed; one, to pile the surplus of rails, unstraightened, in the yard, to be straightened when not engaged in "record breaking," which is expensive and not particularly good for the rails; another way is to cool all the rails on the hot-bed with water, which certainly facilitates matters, but cannot be recommended as good or safe practice. It has actually been done, though, at a works noted for its "distinctive American practice," use of low-silicon pig, and frequency of "beating the record." It is unnecessary to add that these rails so cooled were not popular upon the railway for which they were intended, the manager of which railway was singularly unappreciative of the necessity for "beating the record." These same works, after a month's run, in which the record for the month, week, day and shift were hopelessly smashed, and the works and its manager surrounded with a halo of glory, took three months to straighten and ship the surplus of rails piled in the yard, working Saturday nights and Sundays. During that time the accounting department was entirely in the dark as to whether certain contracts were filled or where they stood with their orders.

There is one individual about the plant who does not enter upon a "record-breaking" spurt with the same enthusiasm as his co-laborers. This is the master mechanic. A broken record has no charms for him. He knows who will have to "pay the fiddler," and 36 hours of steady hard work on his machinery to get it into any kind of shape for the following Monday morning is not alluring. He is the man who is compelled to beat all kinds of records to get ready for next week, and he can testify feelingly that our machinery does suffer by reason of the overdriving incident to "beating the record."

This is a cursory glance at some of the salient features of this peculiarly American institution, whereby many managers gain renown for themselves and their works. I fail to see any feature in it to commend it to universal practice. It simply is a "spurt" by which a rate of speed is attained that could not be continued, and would not be if it could. The manager, therefore, has not proved anything as to his capacity, and has simply succeeded in deteriorating the quality of his product to gratify a foolish and eventually extrava-

gant pride. What, then, is there to praise? I believe most heartily in the spirit of emulation and *esprit du corps*, which is so important a factor in the successful management and operation of our works, but I believe these things should be tempered with reason and judgment.

#### H. M. Howe's Reply.

Mr. Potter's strictures demand a very full reply. In speaking of the Ningunaparte practice of having but from 0.6 to 0.9 per cent. of silicon in the whole vessel charge as "most characteristically American," I thought that the immediately preceding clause, that in the majority of American mills the vessel charge had less than 1.75 per cent. of silicon, made it clear that by "characteristically American" I did not mean usual. The percentage of silicon at Ningunaparte is decidedly lower than at most American mills.

That I have given the Ningunaparte practice undue prominence I cannot admit. It is one of those clouds like a man's hand, whose importance is not readily overrated.

The latest information which I had received from the officers of Ningunaparte gave their usual silicon content as between 0.6 and 0.9 per cent. It is still their favorite practice; but as it is not always convenient to obtain iron with so little silicon, and as, owing to temporary delays, it is sometimes desirable to use a little more silicon, the average proportion of silicon taken over long periods is a little higher. The last returns which I now have, covering a period of nearly a year, give the average proportion of silicon for the whole period as a little less than 0.98 per cent., 10 per cent. of all the heats having less than 0.73 per cent. of silicon.

The Bessemer superintendent writes me March, 1891: "I should have had it lower if I had had the low-silicon pig to melt; as it was, I was obliged to use all kinds of scrap to keep it down." He states further that if the rail mill should take the steel as fast as he could make it, he could run continuously with from 0.66 to 0.76 per cent. of silicon in the molten metal—I believe further reducing its effective calorific power by charging in addition cold steel scrap and blowing steam through the bath.

As far as the calorific power of the charge is concerned, the above average of 0.98 per cent. of silicon is equivalent to an average probably of less than 0.90 per cent. of silicon in the case of charges wholly melted before their introduction into the vessel, for about 4 per cent. of the charge is introduced in a cold state into the vessel, and a great deal of steam is blown through the charge to lower its temperature. By like reasoning the average silicon content of the first four months of 1890, at the Union mill, as given in Table IV, is equivalent to an average of about 0.85 per cent. of silicon in the case of wholly molten charges.

I will now take up some of Mr. Potter's statements in detail:

1. He states that the average silicon content at Ningunaparte is not lower than from 1.75 to 2 per cent. He is misinformed. I have just given the average for a period of nearly a year as less than 1 per cent.

He says that the average silicon in other American works is from 1.75 to 2 per cent.

I had stated that the majority of mills use less than 1.75 per cent. I have before me information from seventeen American Bessemer works, including all the principle ones.

Number using less than 1.30 per cent. of silicon .....	7
Number using less than 1.75 per cent. of silicon .....	13
Number using more than 1.75 per cent. of silicon .....	4

My information from those using more than 1.75 per cent. of silicon is, with one exception, some years old, and it is not unlikely that some of these have followed the general current of American practice, and reduced their silicon. Messrs. Fritz and Gayley have just given you the practice of Bethlehem and Edgar Thomson.

Mr. Potter may be misled by taking as the silicon content of the vessel charge that of the pig iron used. This, however, is first diluted by the addition of scrap before melting in the cupola, then impoverished by the removal of silicon in the cupola, and finally further diluted by the addition of cold scrap in the vessel itself.

2. He says that it is impossible to run continuously with less than 1 per cent. of silicon, because the blast furnace cannot make iron with so little regularly, and free enough from sulphur.

Mr. Gayley has only just told us that the average silicon content of the Edgar Thomson metal (direct metal, I take it), as it goes to the vessel, is 1.10 per cent. If this metal was to be remelted in cupolas, as in common American practice, and if the manager sought to bring the silicon content of his vessel charge continuously below 1 per cent., he could certainly do it by so mixing the iron that each charge would have nearly the average composition of the metal from the blast furnace, or 1.00 per cent. If, now, the metal further lost 0.20 per cent. of silicon in melting in the cupola, and if to the melted charge 8 per cent. of scrap bloom and rail ends were added, the silicon in the vessel charge would be only 0.83 per cent. Mr. Gayley further tells us that at Edgar Thomson the sulphur decreases with the silicon, instead of rising, as Mr. Potter implies.

But the loss in the cupola is often greater than I have here taken it, and the proportion of scrap to be remelted may be higher; so that it should be wholly possible under such conditions (I do not say convenient) for the Bessemer manager continuously to obtain in practice vessel charges even lower in silicon than 0.83 per cent., if he sought them.

3. Admitting that reasonably rapid running does not injure quality, Mr. Potter takes issue squarely with me, insisting that record-breaking efforts injure quality. This is quite a feat, as I had never intimated that they did not. Then follows a vigorous denunciation of record breaking and of the Ningunaparte record breakers. To make sweeping charges against a class of men is easy; to rebut them in detail necessarily difficult. To prove a negative is rarely easy. Many of Mr. Potter's charges cannot, in their very nature, be disproved. Mr. Potter himself has been a notorious record breaker. I find it difficult to believe his charges, even as applied to himself. As I have no interest, beyond a love of truth, in collecting evidence to free other record breakers from his charges, and you none to hear detailed evidence in rebuttal, let it suffice if I insist generically that his picture of what occurs during record breaking is, as regards those record breaking mills with which I am familiar, including Ningunaparte, most grotesquely and unrecognizably exaggerated and distorted; and if, replying specifically, from such evidence as is at hand, I meet with exact numerical data enough of his unsupported assertions to give the reader some idea of their credibility and of the care exercised in their preparation.

4. Mr. Potter never knew a record broken which did not also break the record for high percentage of second-quality rails. I know many, indeed, where, as at Edgar Thomson, the rails are chipped between the passes at the rail train, and where every bloom that gives even the least promise of producing a second-quality rail causes serious delay while its incipient

cracks are chipped out. It is evident that if the output of rails is to be great the proportion of second-quality rails must be small. That this is true witness the fact that the greatest "runs at these works have been made when the percentage of 'second' has been lowest," as I am assured (March 4, 1891) by the most unquestionable authority. Witness the statement of Captain Jones, at the time general manager of these works, that "it is impossible to attain great speed in working while making bad steel."\*

At the Union Works the proportion of seconds for the months of November, 1887, and May, 1888, both of them, I believe, record-breaking months, was 1.53 per cent. and 1.42 per cent., respectively—by no means excessive. I have known mills to make over 10 per cent. of second-quality rails when running at moderate speed.

The output of the Union Works for several of the 17 consecutive months represented in Table IV breaks almost all

charged. If this be madness, there's method in it.

So, too, the average proportion of butt ingots in the last 11 consecutive months in Table IV, all of them high-speed months, was only 0.66 per cent.

6. He says that in record breaking the blowing is more or less inaccurate. So it is; decidedly less inaccurate than to justify his apparent implication. Turning again to the last 11 months, Table IV, we find that the variation in the proportion of carbon in the steel is actually less in the fastest six than in the slowest five months. That is to say, with the irony of fate the rapid work here, even at this tremendous pace, had more accurate blowing than the relatively slow work.

During the famous month of October, 1889, at the Union Works, the carbon in the steel lay, with the exception of a single doubtful heat of the (about) 36,000 heats, within a range of 0.06 per cent. above and 0.07 per cent. below the average. Considering the large number of heats repre-

Table IV.—Work done at the Union Bessemer Works with two 10-ton Vessels.

Month.	Output for month, tons of ingots.	Turns.	Tons of rails per month.	Turns.	Average per cent. silicon.	Average length of blows, minutes.	Average blast pressure, pounds per square inch.	Average number of heats per hour.	Average life of bottoms heats.	Relative number of heats per hour, 1.00 the lowest.	Relative proportion of second quality rails, 1 the average.	Relative variation of carbon, 1.00 the lowest.
1889.												
July.....	28,212.9	47	22,983.5	47	.....	.....	.....	.....	.....	.....	.....	.....
August.....	30,264.4	50	25,107.3	50	.....	.....	.....	.....	.....	.....	.....	.....
September.....	26,264.3	46	21,151.4	46	.....	.....	.....	.....	.....	.....	.....	.....
October.....	36,232.8	54	28,491.6	54	.....	.....	.....	.....	.....	.....	.....	.....
November.....	20,699.1	36	17,771.3	36	.....	.....	.....	.....	.....	.....	.....	.....
December.....	13,235.5	35	12,001.9	26	.....	.....	.....	.....	.....	.....	.....	.....
1890.												
January.....	32,546.0	50	26,555.6	50	0.887	9.98	25.28	5.07	29.75	1.29	1.07	1.06
February.....	28,454.5	44	23,053.5	44	0.876	9.39	25.10	4.93	24.34	1.25	0.97	1.55
March.....	27,494.7	47	22,756.0	47	0.967	9.60	24.40	4.42	23.35	1.12	1.23	1.22
April.....	28,825.4	48	23,151.8	48	0.952	9.19	25.60	4.67	22.51	1.16	1.19	1.32
May.....	21,389.8	39	17,469.4	39	0.999	9.23	26.50	4.04	20.70	1.03	1.60	1.88
June.....	25,016.3	46	20,268.5	46	1.128	9.84	26.52	4.24	19.64	1.07	1.04	1.55
July.....	.....	.....	.....	.....	1.109	9.80	26.00	4.20	19.00	1.06	1.08	1.33
August.....	.....	.....	.....	.....	1.086	10.00	27.50	4.20	17.73	1.06	0.60	1.44
September.....	135,708.0	.....	.....	.....	1.067	9.69	27.60	4.56	22.00	1.15	0.65	1.22
October.....	.....	.....	.....	.....	1.035	10.02	27.34	4.64	21.10	1.18	0.87	1.11
November.....	.....	.....	.....	.....	0.966	10.11	26.12	3.94	19.50	1.00	0.84	1.00

Proportion of Ingots, &c., from January 1, 1890, to December 1, 1891:

Ingots.....	87.43
Butt ingots.....	0.60
Pit scrap.....	2.11
Iron scrap.....	0.20
Loss.....	9.60
Total.....	100.00

records existing prior to the first of them. If there were any necessary connection between the output at these great speeds and the proportion of second-quality rails it should be apparent in this table. Yet it gives no such indication. Confining ourselves to the last 11 months, May, the slowest but one, has 60 per cent. more seconds than the average. The average proportion of seconds for the fastest six months is actually less than that for the slowest five months.

5. He says that in record breaking scrapping is carelessly done. Careless scrapping implies irregularity in the weight of the charge, and hence an excessive proportion of butt ingots—i. e., of pieces of ingots which fall below that weight needed for making an aliquot whole number of rails. Yet in the banner month of October, 1889, at the Union Works (cf. Table I), so far as I know still the champion month for the whole world, the proportion of butt ingots was only 0.47 per cent. of the total weight of metal

sent, considering that in order to save iron it is desirable to arrest the blow at the first marked indication of shortening of the flame, is this more or is it less inaccurate blowing?

Now, does this inaccurate blowing, which, Mr. Potter says, arises during record breaking, consist in blowing sometimes too long and sometimes not long enough? In that case the insufficiently blown heats would give steel which would be too hard, and the resulting rail should either be classed as of second quality or rejected. But, as we see elsewhere, there is no indication of an excessive proportion either of second-quality rails or of rejected rails.

Or does the inaccurate blowing consist solely in sometimes blowing too long? In this case the loss of iron should be excessive. Yet, in the banner month of October, 1889, at the Union Works, the loss was only 10.85 per cent.; the average loss for the last 11 rapid months of Table IV was only 9.60 per cent.

Finally, inaccurate blowing should cause irregularity in the weight of the

\* "Journal of the Iron and Steel Institute," 1881, I, p. 137.



blown charge, with consequent increase in the proportion of butt ingots; yet we have seen that this proportion is so insignificant as to indicate extreme accuracy in all the conditions affecting the weight of the blown metal, whether as to weighing, blowing or pouring.

7. He says that during record breaking the steel is poured hurriedly and in a slovenly manner; the nozzles are badly set, causing imperfect streams; the molds are irregularly set, so that large fins form on the bottoms of the ingots. If this is true, it should manifest itself by increasing the proportion of second-quality rails, of pit scrap and of butt ingots. If the pouring is irregular, the weight of the ingots must vary, and hence a considerable weight of butt ingots must arise. We have seen that their weight is inconsiderable.

Actually only 2.30 per cent. of scrap altogether was made in the month of October, 1889, at the Union Bessemer Works, of which 2.21 per cent. was pit scrap, and 0.09 per cent. was iron scrap. So, too, in the last 11 consecutive rapid months, given in Table IV, only 2.11 per cent. of pit scrap was made.

The effect of record breaking on the proportion of second-quality rails we have already considered.

8. He says that during record breaking the molds are insufficiently cooled. The effects of insufficient cooling should be, first, to cause the ingots to stick in the molds, thus delaying operations hopelessly, and so preventing record breaking, and causing cracks in the ingots, and thus leading to increasing the proportion of second-quality rails; and, second, to hasten the destruction of the molds.

But we find that in October, 1889, at the Union Works, the molds lasted unusually long—viz., an average of 92.63 heats each. This agrees with common experience and common sense—that it is only by the closest attention to such details as the proper cooling of the molds that great speed can be maintained.

9. He says that during record breaking the ingots are stripped too soon. If the ingots are to be heated on end, which is thought the best practice, and which is done at the Union Works, they cannot be stripped too soon, so far as quality is concerned. The only danger in very early stripping is that the ingots may bleed; but the low proportion of pit scrap, 2.21 per cent., already referred to, shows that no serious amount of bleeding can have occurred.

10. Any of the evils five to nine inclusive would seriously impair the quality of the steel. The statement that either careless scrapping, or irregular setting, or insufficient cooling of molds or early stripping of ingots would seriously injure the steel, points to that "going with a rush" into print which Mr. Potter deplores as applied to Bessemer practice.

11. During record breaking the ingots are either over or under heated; rolls are not changed often enough; neither are the saws, so that they cut roughly and inaccurately; rails are straightened so hot that they thereafter warp in cooling. Charges easy to make—hard to refute. Each of these evils would be likely to lead to rejection by the purchaser's inspectors, and should thus diminish the shipments of rails. For if the steel were not at the desired temperature on entering the rolls, neither would it be on leaving them and on sawing; hence its contraction after sawing would be either too great or too little, and the rails would not be true to length and should be rejected. If the rolls were not changed often enough the rails would not be true to section and should be rejected. So, too, if the saws cut irregularly, the rails, not being true to length, should be rejected.

Turning now to the facts, we find that in the record-breaking month of May,

1888, at the Union Works, the shipments of rails were 96 per cent. of the weight made, which tallies ill with the Bessemer reign of terror which Mr. Potter so ruthlessly exposes.

12. It is hard to comment on Mr. Potter's remarks about insufficient hot-beds. Nobody applauds insufficient hotbeds, nor do they form a feature of American rapid practice. There is room in our country for all the hot-beds needed. Nor is it common American practice during record breaking to cool rails with water. It has been done after the rails have become perfectly black, but never, so far as I know, injuriously. In stating that, at the mill he clearly refers to, it took three months to straighten and ship the excess of rails piled in the yard during a single record-breaking month, I have it on direct authority that Mr. Potter is wholly misinformed.

13. He says that our machinery does suffer from overdriving incident to beating the record. A bare assertion wholly unsupported by evidence. To reconcile it with the detailed statements as to the actual endurance of our machinery given in the body of my paper, and with the almost record breaking output kept up during the greater part of the 17 successive months given in Table IV, few will find easy.

Looking at it now in a general way, it should be apparent to every one experienced in executive work that, where great speed is to be kept up for a month at a time, the very administrative difficulties which must arise demand as a fundamental condition that there shall be no mad rush; that every detail shall not only be carefully thought out beforehand, but carefully executed. "The utter recklessness," the "slovenly, careless work," "the mad struggle," which exist, according to Mr. Potter, must necessarily defeat themselves. He who would run a rod at highest speed may indeed rush madly; he whose army spans a continent the swiftest husbands his resources, looks well to diet and shoeing; while he must not waste time, neither dare he waste strength. What protracted struggle against time or man or beast was won by utter recklessness, mad rushes, carelessness and slovenliness?

While, like Mr. Potter and every other sane man, I would not commend record breaking "for universal practice," I am confident that its occasional practice is desirable; for, in preparing for a record-breaking effort and in carrying it out, expedients are devised in the way of organization and of detail of procedure; short cuts are established, which are used after the effort has ceased, and which may introduce great economies. Witness our low-silicon practice. A speed is reached which, indeed, cannot be long sustained then; but the experience gained permits a greater permanent speed than was possible before the spurt, and when we return to normal speed it is no longer that which was normal before. Little by little the organization adapts itself to this new speed till it is as easy as the old one was. Then comes a new spurt, with another rise of the normal speed. After a number of these elevations of the normal we find that it is far, far beyond the maximum speed of our early spurts. Thus the average output of the 17 consecutive months in Table IV is 78 per cent. greater (or, if we omit the three months in which extraordinary delays from strikes, orders from the directors and the annual stoppage for general repairs, 90 per cent. greater) than the 15,000 tons which Captain Jones looked forward to in 1881 as the probable limit which we might some day reach.

I am confident that these spurts have, on the whole, been productive of good, both to mill owners and the public; that

it is in no insignificant degree due to them, and to the talent which has directed them, that the cost of the Bessemer process has diminished so greatly; that in general—certainly in the cases which Mr. Potter singles out for attack—haste has been "tempered with good reason and good judgment."

I am surprised that Mr. Potter thinks that either the intelligence or the character of the men who have broken our records would permit them to sacrifice the interests of which they are the trustees in the way that he depicts, especially when the president behind has his finger ever on a button which would blow the earth from beneath the manager's feet.

### Testing the Guns of the Vesuvius.

Experiments of wide significance have just been completed with the pneumatic dynamite guns of the United States cruiser Vesuvius. These tests were undertaken for the purpose of ascertaining the degree of accuracy that could be depended upon under all conditions. Dummy shells of the same weight as dynamite shells were fired at dead and moving targets, with the cruiser stationary and in motion. Shots were fired at 1 mile,  $\frac{1}{2}$  mile and  $\frac{1}{4}$  mile.

All the shots fired when target and boat were both stationary and when the boat was approaching the target at full speed were so well aimed that they would have struck a vessel of her own size. At a moving target—a cutter in tow of the Cushing—three shots were fired, the Vesuvius approaching at a speed of 17 knots. The first shot, mile range, went 200 yards beyond the cutter, and apparently not in range. The second shot,  $\frac{1}{2}$ -mile range, went  $\frac{1}{2}$  mile beyond the cutter. The third shell,  $\frac{1}{4}$ -mile range, struck the water  $\frac{1}{4}$  mile short of the target and considerably out of range.

Our readers are familiar with the construction of the Vesuvius. Rigidly fixed in the bow at an angle of 18° are three 15-inch pneumatic guns. The boat itself is thus made to serve as the gun carriage, the rudder being employed to bring the guns in line with the object aimed at, while the pressure of the air admitted behind the projectile governs the length of its flight. If these were the only factors composing the problem of the accuracy of fire the tests would undoubtedly have been more successful. But when we take into consideration the fact that there is always more or less motion due to the action of the waves the problem becomes one of vast intricacy. This wave motion places the gun, in a practical sense, absolutely beyond control as far as certainty of aim is concerned. An almost imperceptible lurch requires instant correction, and if not allowed for destroys all accuracy. This reduces the question to one of guesswork, in which experience and seamanship count for naught.

The failure of the Vesuvius as a sea-going dynamite cruiser does not in any way influence the usefulness of the pneumatic gun as a shore weapon. Repeated trials have fully demonstrated its general effectiveness, and that it will be widely employed for harbor defense is almost assured. The action of the Government in constructing such a vessel as the dynamite cruiser was wise, since only by experiments with a full-sized model could all the characteristics be learned. It is not probable that the second vessel of this type, the building of which has been authorized, will ever be undertaken.

At Bordeaux, France, shipbuilding has almost entirely ceased, notwithstanding the bounties offered by the Government.

### Green River Screw-Cutting Machines.

Several new forms of bolt cutting, nut-tapping and pipe-threading machines have recently been placed on the market by the Wiley & Russell Mfg. Company of Greenfield, Mass. The machine shown in Fig. 1 is for power only. It is adapted to light work up to  $\frac{1}{2}$  inch, either crooked or straight. The chips and oil are caught in the bed and the oil can be strained and used over again. The counter shaft is provided with patent friction pulleys, which are noiseless and smooth and easy in operation. Each pulley is made with two right and left screws, of very steep pitch, which apply the friction irresistibly

places, thereby making it possible to thread a lot of bolts of different sizes almost as quick as if all were of the same size. Each die cuts a full thread at one operation, and the hollow spindle allows a screw of any desired length to be cut.

The jaws of the chuck are made of tool steel, have three changes of size to enable iron, large or small, to be properly grasped, thereby keeping the jaws sharp and in good order. The attachment for working by hand can be quickly disengaged.

An American naval officer writes a description of the port of Vladivostok for the June *United Service*. Vladivostok,

immense wooden screws, nearly 18 feet in diameter, looking very much like the screws of ocean steamers, only with broader blades. The steam is generated by heating copper by petroleum, and is condensed after being used, so that we get along with 2 gallons of water. The boiler is of the finest Whitworth steel, and we will use about 40 pounds of petroleum per hour. The machine will be placed at an angle of about 1 foot in 18 inches on a railroad track 12 feet wide. At 30 miles an hour it will barely skim along, the pressure of the air underneath it being then equal to 1 pound for each square foot, or just sufficient to lift it. At 35 miles an hour it will begin to rise, and as the speed in-

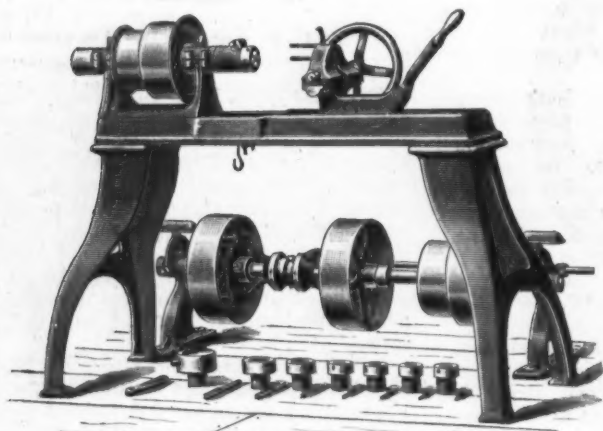


Fig. 1.—Bolt Cutter and Nut Tapper.

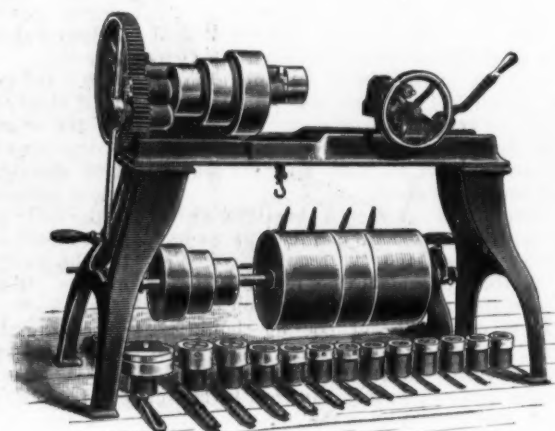


Fig. 2.—Bolt Cutter, Nut Tapper and Pipe Threader.

at the touch of the operator and release the pulleys instantaneously upon reversal of the action. They cannot slip or work loose and are readily adjusted. The dies provided with this machine are made in two pieces, accurately and securely held by screws. This construction permits of correcting the effects of wear and the dies can be altered to make nuts fit tightly or loosely, as may be desired for special work. Taper headed screws in the face of the die govern the size of the cut. The points of these screws hold in the rim at the bottom of the socket. The outside screws close the dies together from the sides and hold the portions firmly in place.

The capacity of the machine shown in Fig. 2 is for  $\frac{1}{4}$  to  $1\frac{1}{2}$  inch bolts and nuts and  $\frac{1}{2}$  to 2 inch pipe. The spindle is hollow, the hole through it being  $1\frac{1}{2}$  inch in diameter. The vise is made to center and hold properly the various sizes and to take work of irregular shapes. The machine is for either power or hand use. The attachment to enable it to be used by hand—consisting of the system of gears shown at the left—is frequently of service on repair work at times when power is not available. It can be thrown out of gear when not needed.

The capacity of the machine shown in Fig. 3 is for pipe  $\frac{1}{2}$  to 2 inches and for nuts  $\frac{1}{4}$  to 2 inches. The hole in the spindle is  $2\frac{1}{2}$  inches. The dies are secured in two equal wheels set side by side, and controlled by a right and left screw, each die being divided, the half in one wheel opposite to the half in the other, in such a manner that a complete working die is made by bringing the wheels together, and the finished screw released by separating them, thus saving running back over the threads.

Each die has independent stop-pins controlling its cut, which can be either shortened or lengthened, enabling a perfect adjustment to be maintained, all the different dies standing ready for use, so that any size may at once be brought into line by turning the wheels to the proper

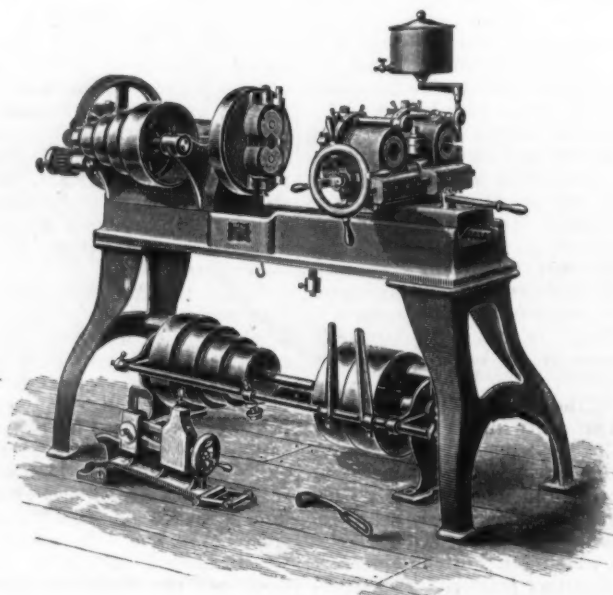


Fig. 3.—Pipe-Threading, Bolt-Cutting, Nut-Tapping and Cutting-Off Machine.

which is said to mean in the Russian "Master of the East," is becoming every day more and more important as the naval station of the Imperial Government in relation to the Chinese and Japanese seas. A fine bay forms the harbor, which is soon to be provided with heavy forts. A floating dock is in contemplation which will enable the Russian naval force in the Pacific to be independent of the services of those in foreign lands in that part of the world.

Hiram J. Maxim, the gun inventor, claims to have devised a flying machine of silk and steel, which will weigh 5000 pounds and lift 40,000 pounds. He says: "This machine will be 110 feet wide and 40 feet long. It will be propelled by two

creases it will mount higher and higher. When you want to descend you will slacken speed, or if you wish to proceed on a straight line on a certain height you come back to 30 miles an hour. It can be done as sure as fate. I have spent \$45,000 already upon it, and I did not enter upon the work until I was convinced that the idea was practical."

The Riparian Commissioners of New Jersey, in a conference with the Harbor Line Board, proposed the building of two artificial islands, the outer edges of which are to be on a line drawn from the light on Robbin's Reef to the statue on Bedlow's Island. The islands are to be 2 miles long and 600 feet wide, with piers extending 800 feet on each side into water



24 feet deep without dredging. One thousand feet of clear water will separate the islands from each other and from Bedlow's Island and Robbin's Reef. The project is strongly resisted by all the riparian owners.

#### Atkinson's Cycle Gas Engine.

At the present time our attention is attracted by any device that promises to reduce the cost of producing power, or, to state it with greater accuracy, utilizes a

"3. The greatest possible expansion; and  
"4. The greatest possible pressure at the commencement of the expansion."

In using boiler tubes, he states, the efficiency of the heat transmitted increases with the reduction in the diameter of the tubes. In the case of engine cylinders, therefore, the loss of heat of explosion would be in inverse ratio to the diameter of the cylinders.

Therefore, he reasons, an arrangement which, for a given consumption of gas, gives cylinders of the greatest diameters,

"4. Forcing out of the burned gases from the cylinder on the fourth and last return stroke."

The ignition he proposes to accomplish by the increase of temperature due to compression. This he expects to do by compressing to one-fourth of the original volume.

In designing an engine to meet the conditions laid down above the first may be provided for by careful designing and the second by high piston speed, this being limited by the time necessary for complete combustion. But the difficulty begins with the third, as the greatest possible expansion can only be obtained by expanding the charge to a volume greater than the original volume, for when expanded to the original volume only the charge will have a high terminal pressure, and if expansion is only carried to this point the products of combustion will be discharged with a large amount of energy not utilized. The difficulty also continues with the fourth, as the purer the mixture the higher will be the pressure at the commencement of the expansion, and in an engine in which the four strokes are of equal length it is impossible to obtain a pure mixture, owing to the fact that the necessary compression space is, after the exhaust stroke, left full of the products of combustion, and these, of course, adulterate the charge and reduce the pressure. There is also another disadvantage attending the use of such a compression space, and that is that it places a limit upon the size of the engine, for if an engine of large power is built the cooling surface of the cylinder will bear such a small ratio to the volume of the cylinder that the percentage of heat lost to the surfaces by the products of combustion during the exhaust, suction and compression strokes will be very small, and the temperature of the charge will be so high that when the heat due to compression is added a premature explosion will take place and the motion of the engine be retarded or reversed. Consequently to increase the power of engines after certain power has been reached one or more cylinders have been added, forming in reality separate and distinct engines connected to one crank shaft.

The accompanying engravings represent a new engine which, it is claimed, not only overcomes the difficulties presented by the third and fourth conditions, but also the latter trouble—all the operations are performed in one revolution of the crank shaft. Fig. 1 is a perspective view of the engine, and Fig. 2 a sectional elevation showing only the mechanism by which the above operations are effected. It will be noticed that the different operations are obtained by the addition of but two parts—a link which vibrates through the arc of a circle and a connecting rod—and by changing the position of the crank shaft in relation to the cylinder. The outer end of the piston connecting rod is attached to a pin passing through the crank connecting rod, and the latter is connected to the link; the different centers are so placed in relation to each other and to the center line of the cylinder that the center of the pin to which the piston connecting rod is attached travels in a curve resembling the figure eight, passing over the portion S E during the suction stroke, over C W during the compression stroke, over W E during the working stroke and over E S during the exhaust stroke. The figure shows that the compression stroke is shorter than the suction stroke, that the working stroke is almost double the suction stroke, that the exhaust stroke ends with the piston as close to the cylinder cover as it is possible mechanically to have it, and that the working stroke takes place in one-quarter of a revolution. It is said that, with a given rotative speed, greater rapidity of expansion can be obtained with this en-

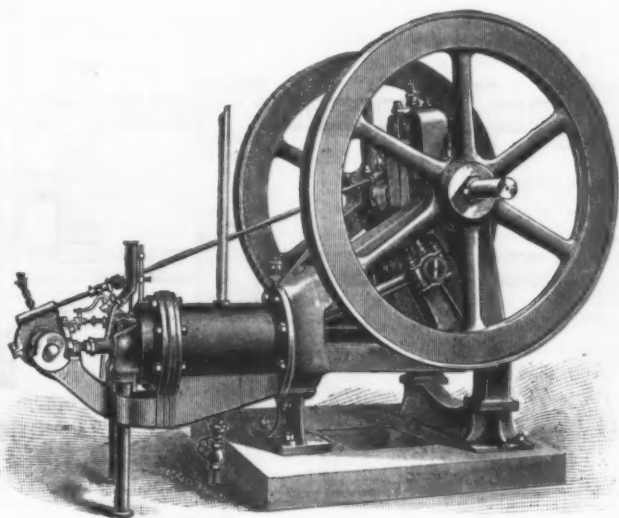


Fig. 1.—Atkinson's Cycle Gas Engine.

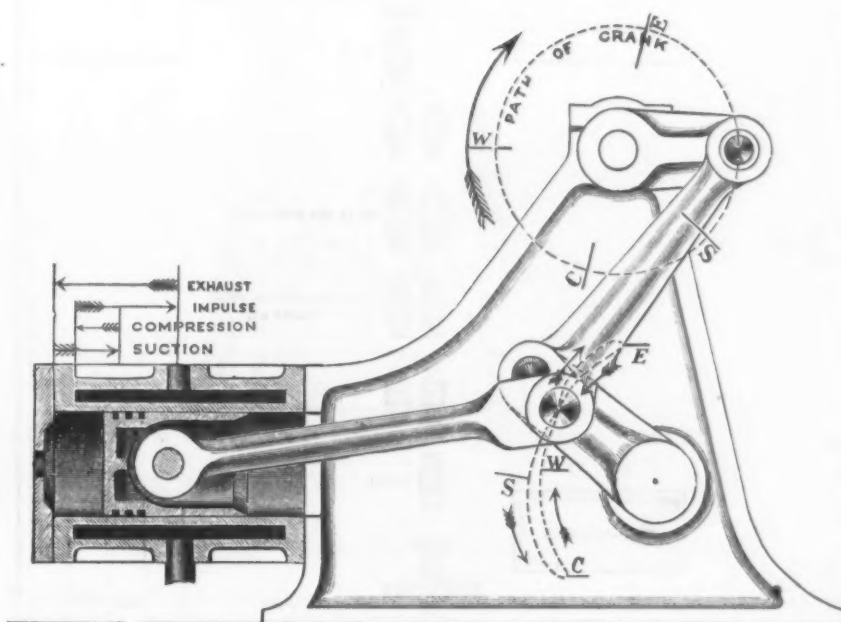


Fig. 2.—Sectional View of Gas Engine.

larger percentage of the energy stored in coal. At the present time the gas engine leads, developing an indicated horse-power from less than  $1\frac{1}{4}$  pounds of coal, results of one test showing 1.11 pounds per indicated horse-power per hour and that, too, in a 12-horse engine developing but seven or eight horse-power. Clerk, in his work, "The Gas Engine," refers to a pamphlet published by Beau de Roches, in Paris, in 1862, and we quote: "He states that, to obtain economy with an explosion engine, four conditions are requisite:

"1. The greatest possible cylinder volume with the least possible cooling surface.  
"2. The greatest possible rapidity of expansion.

will give the best economy or least loss of heat to the cylinder. One cylinder only must be employed in such an engine.

But loss of heat depends also upon time; cooling, therefore, will be proportionately greater as the working speed is slower.

The sole arrangement capable of combining these conditions, he states, consists in using the largest possible cylinder and reducing the resistance of the gases to a minimum. This leads, he states, to the following series of operations:

"1. Suction during an entire out stroke of the piston.

"2. Compression during the following in stroke.

"3. Ignition at the dead point and expansion during the third stroke.

gine than with engines of the Otto type, and that it is possible to expand the charge to such a volume that the terminal pressure will be reduced to the lowest practical point and that, owing to the purity of the charge, the greatest possible pressure will be attained at the commencement of the expansion. Further, that, owing to the fact that practically all the products of combustion are expelled, the incoming charge will attain no higher temperature in a large engine than in a

in opposite edges of the openings D for preventing the displacement of the side pieces. Both edges of the housing upon opposite sides of the recess D are provided with projections G', through which the clamping bolts I are passed. The openings D in opposite edges of the housing give to the housing sufficient elasticity to allow the bolts I to draw the projections G' sufficiently together to cause the side pieces F to be held rigidly in position. When the bolts I are loosened, the side pieces F

erating gears O at their upper ends, and which gears mesh with the long central pinion P, to the shaft of which the hand wheel Q is secured. A long pinion, P, is used, so as to operate the gear-wheels O in either a raised or a lowered position. The lower ends of the screws L N are made to depress the two upper rolls B C, so as to bring them nearer to their corresponding lower rolls, the amount of depression being the same on both rolls at each turn of the pinion P.

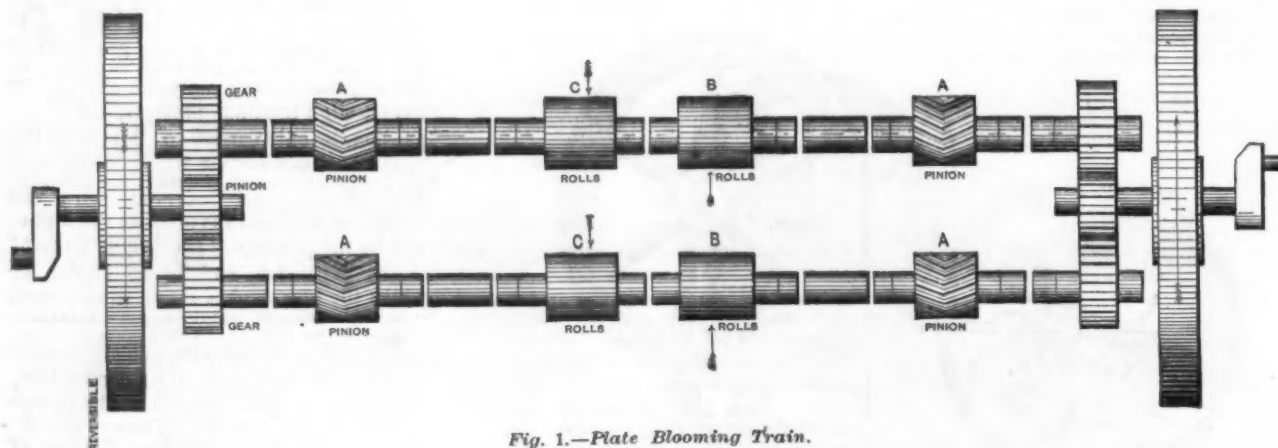


Fig. 1.—Plate Blooming Train.

small one and, consequently, large sizes can be built.

This gas engine is made by Henry Warden of Germantown Junction, Philadelphia, Pa.

#### The Howell Compound Two-High Mill.

It is generally acknowledged that the manufacture of thin sheets has been the least progressive of any department of rolling-mill work, both in this country and in Europe. We have dwelt upon the necessity of thoughtful consideration of this matter, which is destined to become of particularly great importance with the establishment and growth of the American tin-plate industry. Improvement in this direction is only secondary to the aim of making tin plates, which shall prove more serviceable in use than a large proportion of the Welsh product now is. The slow and laborious methods of rolling the black plate must give way to rapid and automatic work. American rolling-mill managers are already working in this direction, a particularly interesting plan being that of W. G. Howell of the Keystone Horse Shoe Company, Philadelphia. For the preliminary work Mr. Howell proposes a blooming mill, Fig. 1, to reduce the slab to  $\frac{1}{4}$  or even  $\frac{1}{8}$  inch thickness, and thus relieve the finishing mill of much work, and very materially increasing its capacity. The rolls B B and C C are all at the same level. The ingot or slab to be passed through the rolls B receives two reductions. It is then returned through the rolls C C, revolving in the opposite direction, again receiving two reductions. The engine required would be 30 x 40 inches, running 100 revolutions, while the rolls would be speeded to 50 revolutions. The slab is then taken to the Howell mill, of which Fig. 2 is a general plan, while Figs. 3 and 4 show the details. A represents the housing in which the two pairs of rolls B and C are journaled in the usual manner. Through opposite edges of the housing are made the openings or recesses D, through which the rolls are passed into position, and in which the side pieces or blocks F are placed for holding the boxes of the rolls in position. Each one of these side pieces is provided with the projections E, which catch in corresponding recesses

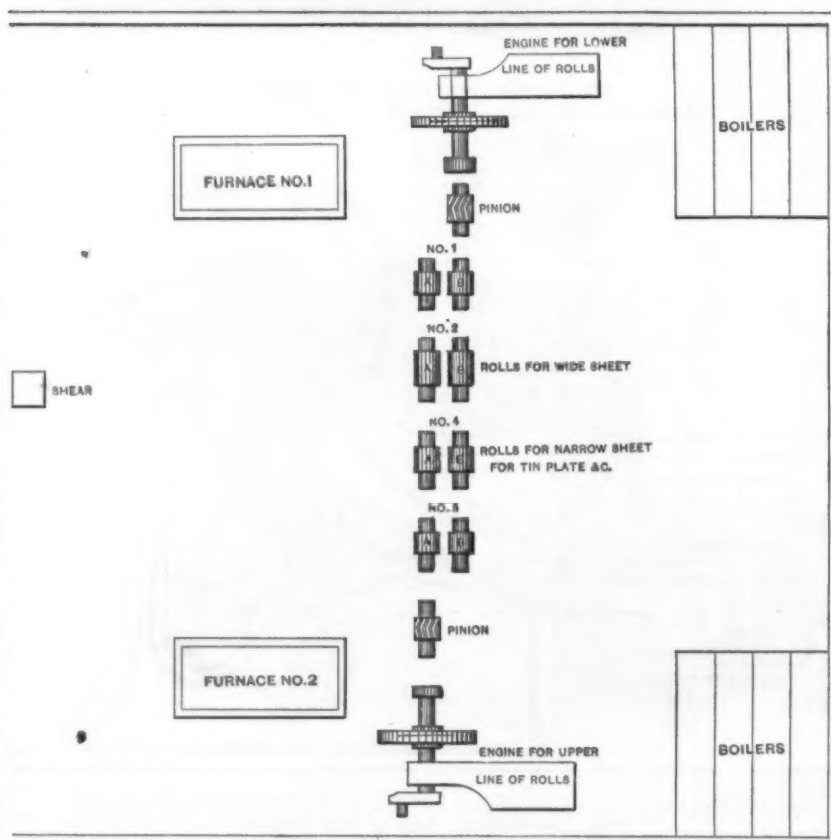


Fig. 2.—Plan of Tin-Plate Mill.

can be freely removed, and then the rolls can be removed through the openings D without removing the mechanism for raising or lowering the top rolls.

The two pairs of rolls B and C are journaled in the housing, the lower one of the rolls C being on a level with the upper one of the rolls B. These two pairs of rolls B C are geared together by the pinion J, to one end of the shaft of which the power of the engine is applied, and which revolves the pairs of rolls in opposite directions. Passing vertically down through each end of the housing A are the two screws L N, which are provided with op-

Through the lower portion of the housing are made the four grooves R, through which are passed the rods S, which have their upper ends to bear against the lower corners of the boxes T of the upper rolls. The lower ends of these rods bear upon the top of the pivoted and weighted lever N, so that when the screws are turned backward the weighted lever through the rods S raises the upper rolls. The weight V upon the lever may either be secured thereto or be adjustable thereon; but it must be sufficient to move the boxes T upward, and thus separate the rolls. The rolls are made to revolve in the direc-



tion of the arrows, and the pile or slab is first passed through between the two rolls B, between the two rolls C, and then over the roll X and top roll B. After the pile or slab has been once passed through both sets of rolls the wheel Q is turned, so as to depress the two top rolls B C a sufficient distance, when the pile or slab is again reduced, and this is proceeded with until the reduction is complete. As the pile is reduced in both its forward and backward movements, it will be seen that only one-half the time is required to accomplish the reduction that is usually required in plate mills. The sheet as it becomes long can pass through the upper and lower pair of rolls at the same time, which is impracticable on a three-high train.

Mr. Howell is also the inventor of a device for cold rolling and polishing, which

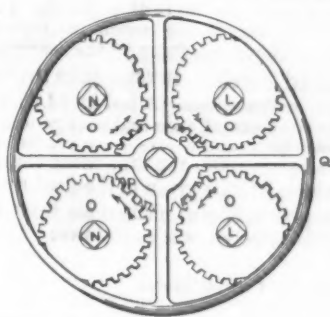


Fig. 3.—Plan of Elevating Mechanism.

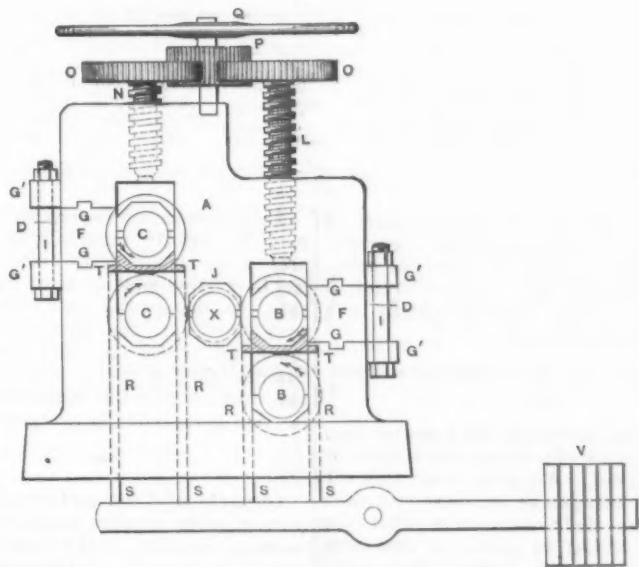


Fig. 4.—Elevation of the Howell Compound Two-High Plate Mill.

is equally applicable for sheets, and by covering the middle pair of rolls with sheepskin or other suitable material, can be used for the final cleaning, which is done now by rubbing by hand. The device consists of two sets of rolls, which revolve in the same direction, while the third set of rolls revolve in the opposite direction and polish the shaft or rod which is passing through between all three sets of rolls, the two outer sets of rolls being made to reduce the shaft or rod while the central set of rolls merely polish it. The operation of this mill as planned by Mr. Howell is as follows:

A slab 20 or 30 x 2 x 24 inches is reduced in the first set of rolls (No. 1) to a strip or sheet  $\frac{1}{4}$  inch thick and 16 feet long; it is then passed to No. 2 rolls and reduced to  $\frac{1}{8}$  inch thick and 32 feet long, then cut into four pieces, each 8 feet in length; these pieces are then packed four high, every other sheet being "reversed" and passed through furnace No. 2. The pack from furnace No.

2, which, as will be noted, is  $\frac{1}{4}$  inch thick, is passed through rolls No. 3 and reduced to  $\frac{1}{8}$  inch thick, and then taken to No. 4 rolls and reduced to  $\frac{1}{16}$  inch, giving, when the rolling is completed, four sheets about Nos. 28 to 30, about 64 feet long. For making wider and thicker sheets the slab is reduced in the first set to the required thickness, taken to the shears and cut to the width of the required sheet. It is presented broadside to the rolls No. 2 and reduced to the required gauge.

Mr. Howell estimates that such a mill can produce 100 tons per day of 20 hours, after a proper organization has been effected, with no more labor than is now used for one-tenth that amount. A striking advantage would be the manufacture of long sheets, which would also facilitate the tinning process and the operations of consumers of tin plates, to whom they could be sold in reels.

**Trust Agreements Invalid.**—Three years ago a combination called the American Preservers' Company was formed by the leading manufacturers of preserves, jellies and the like, and the Taylor Mfg. Company of St. Louis became a part of it. The Taylor company received a certain number of the shares or certificates of the trust and also \$17,750, and the controlling stockholders of the absorbed company agreed that they would not within 25 years, or so long as the trust should exist, resume their old business in that city. About one year ago, however, the Taylor

1890, an increase of \$17,599,400. This makes the rate of city taxes this year \$15.8147 per \$1000, an increase of about \$1.18 over 1890.

## MANGANESE ORES.

The census office has contributed another valuable bulletin to the statistics of mines and mining, relating to manganese. It shows the production of manganese of the entire United States to be 23,927 long tons, with a total value of \$238,939. This product is principally from the localities of Crimora (Va.), Cartersville (Ga.) and Batesville (Ark.), these districts having yielded 20,325 long tons. The ores are treated under three general classes, namely: manganese ores, manganiferous iron ores and argenteferous manganese ores, and valuable information and statistics concerning each class are given.

The following is the full text of the bulletin, of which Jos. D. Weeks of Pittsburgh is the author:

### CLASSIFICATION OF MANGANESE ORES.

The ores of manganese, or those carrying manganese, may be divided into three general classes: First, manganese ores; second, manganiferous iron ores, and, third, argenteferous manganese ores. The dividing line between the first two grades is taken at 70 per cent. binoxide of manganese, equal to 44.252 per cent. metallic manganese, this being the standard of shipments to English chemical works. All ores containing at least this amount of manganese are classed as manganese ores; those containing a less percentage of manganese, containing also more or less iron, are classed as manganiferous iron ore. In the third class are included the argenteferous manganese ores of Colorado, which are utilized chiefly for the silver they contain. They have an added value, however, by reason of the fluxing qualities imparted to them by the presence of manganese and iron. The long ton of 2240 pounds is used in this report.

### OCCURRENCE.

By far the larger proportion of manganese produced in the United States is mined in three localities: Crimora, Va.; Cartersville, Ga., and Batesville, Ark.

Of the 23,927 tons of manganese produced in the census year, 20,325 tons were from these three districts. Manganese is found, however, in many places in the United States. For example, all along the western slope of the eastern ridge of the Appalachian range, from Maine to Georgia, more or less manganese has been mined. There is also considerable manganese found associated with the hematite ores of the Lake Superior region, and in Arkansas southwest from Batesville. With few exceptions, however, the deposits are small, and the indications are not such as to justify the expenditure of large amounts of money in mining and washing plants, which are usually necessary in the economical production of manganese. From one locality in Vermont, however, as will be seen by the report, considerable manganese has been produced, and there are mines in Virginia along the Shenandoah Valley and its southern extension, as well as on the upper James, at which considerable manganese was produced in 1890, and which it is believed will add largely to its production in this country in the near future. A similar statement can be made of mines in Georgia.

### PRODUCTION OF MANGANESE ORES.

In the following table will be found a complete statement of the production of manganese in the United States in 1889; also a statement as to its total value, the average value per ton, the number of em.

The total assessed valuation of real and personal property in Buffalo this year is \$179,958,850, as against \$162,359,450 in

ployees engaged in mining, total wages of such employees, and total capital for all the States in which manganese was mined, except Vermont and Virginia :

what above the limit dividing manganese and manganiferous iron ore, the average shipment for 1889 showing 46 per cent. metallic manganese.

manganese in these ores makes them desirable as fluxes.

Nearly all the argentiferous iron ores mined from the upper workings of the Leadville deposits carry manganese in varying quantities from 5 up to 25 per cent., and occasionally 30 to 35 per cent., with 5 to 20 ounces of silver, 0 to 4 per cent. of lead, 7 to 18 per cent. in silica, and 30 to 35 per cent. of iron. It has been estimated that from 300 to 500 tons of this ore are produced per day. On the basis of the lowest figures; that is, 300 tons a day for 300 days in the year, the production of argentiferous manganese ore in the Leadville district would be 90,000 tons, but, as stated above, the total detailed reports received of this production are for only 17,550 tons.

These ores are sold to the smelters for fluxing the siliceous silver ores, and are usually paid for according to the silver contents; that is, so much per ounce of silver, without reference to the manganese contained therein. In some cases the value of this ore has been placed at \$3.50 a ton for its contents of iron and manganese.

Some manganese ores were produced in Colorado in 1889, the statement concerning which will be given in the final report.

The production of manganese from 1880 to 1889, inclusive, was as follows:

Production of Manganese Ores in the United States in 1889.

States.	Production.	Total value.	Value per ton.	Em- ployees.	Wages.	Capital.
Total.....	23,927	\$238,939	\$9.99	432	\$123,858	\$2,094,475
Arkansas.....	2,528	\$23,173	\$9.17	96	\$33,191	\$1,200,000
California.....	53	901	17.00	10	1,149	2,400
Georgia.....	5,208	50,143	9.63	117	19,486	175,125
Nevada.....	15	83	5.53	2	53	600
North Carolina.....	17	170	10.00	2	60	250
South Carolina.....	124	744	6.00	6	400	5,000
Tennessee.....	30	130	4.00	3	70	100
Vermont.....	1,336	7,348	5.50	25	3,510	(a)
Virginia.....	14,616	156,257	10.69	171	65,939	711,000

a Included in Virginia.

In the preceding table is included a very small amount of ore, which, under strict classification, would be regarded as manganiferous iron ores, but as the metallic manganese in but few cases falls below 40 per cent., they are all reported as manganese ores. Less than 1000 tons of ore fall below 44.252 per cent. of metallic manganese, and the average of the whole 23,927 tons is above this percentage.

Certain explanations of these statistics are necessary to prevent wrong deductions or conclusions. In but four instances at the most is manganese ore mining prosecuted in the United States with anything like regularity, and in but two of the four was mining continuous. At the works producing the largest amount of manganese in Georgia the mines were operated but 190 days in the year, while at the Vermont mine during a large proportion of the year but little work was done. At one mine in Virginia and one in Arkansas the mining of manganese is fairly continuous. At most of the other works the production reported has been from very irregular workings, and chiefly for the purpose of testing the character of the deposit. This is true of all the production of Tennessee, North Carolina, South Carolina and Nevada, while the California production is from an old mine, worked occasionally to meet a small demand for manganese for the purpose of making chlorine gas in working sulphuret ores.

It will be judged from this statement, therefore, that the reports in the table as to the number of employees and wages paid simply refer in most cases to men who were employed for a very brief time, and who were in most instances common laborers picked up from farm and other work, returning to their ordinary occupations as soon as their temporary services in stripping manganese ore deposits and in mining the small quantities of manganese reported were completed.

The item of capital includes not only the money actually invested in works, but also the value of the mine or mineral right. In some cases a high valuation is placed upon these rights, and future developments will be necessary to determine whether it is too high.

**Production by States.**—From the table of the production of manganese, given above, it will be seen that 61 per cent. of the manganese produced in the United States was from the mines of Virginia. Of this production 12,974 tons were from the well-known Crimora mine and the opening adjoining it, known as the Old Dominion mine. More manganese has been taken from these two mines, which are practically the same deposit, than from all the rest of the United States, and it is probably fair to say that this deposit has produced more than any other mine in the world. The grade of the ore is some-

Georgia stands second in point of production. Of the 5208 tons produced in this State in 1889 over 4000 tons were from the mines of one company.

Arkansas stands third in point of production, and here again by far the larger proportion of the ore produced was from

Production of Manganese Ores in the United States.

States.	1880.	1881.	1882.	1883.	1884.	1885.	1886.	1887.	1888.	1889.
Totals.....	5,761	4,895	4,532	6,155	10,180	23,258	30,193	34,524	29,198	23,927
Virginia.....	3,661	3,295	2,982	5,355	8,980	18,745	20,567	19,835	17,646	14,616
Arkansas.....	.....	100	175	400	800	1,483	3,316	5,651	4,312	2,528
Georgia.....	1,800	1,200	1,000	.....	.....	2,580	6,041	9,024	5,568	5,208
Other States.....	300	300	375	400	400	450	260	14	1,672	1,575

one mine. The fourth State in point of production of manganese was Vermont, 1336 tons being produced from one mine. As is noted in the table, the production of manganese in other States has chiefly been in an experimental way.

#### PRODUCTION OF MANGANIFEROUS IRON ORES.

A large proportion of the hematite iron ores of the United States carry more or less manganese. While in most cases the amount of manganese in these ores does not increase their value over what the same ores would be worth as iron ores were the manganese absent, they, however, make the ore more desirable for certain purposes. No attempt has been made to collect the statistics of these manganese-bearing iron ores except in cases where the manganese in them has added somewhat to their value.

A product of 31,341 tons of ore, containing on an average 9 per cent. of manganese, is reported from Michigan, and a further product of 50,018 tons of ore, containing 6.74 per cent. of manganese, is reported from the same State, making a total of 81,359 tons of iron ore produced in Michigan containing sufficient manganese to make it desirable to be mined. The value of this ore is reported at \$4.54 a ton. It is impossible to give any statement as to the number of employees, amount of wages, or capital invested in the production of this manganese, as these items are included in the report on the iron-ore production of the mine supplying it.

#### PRODUCTION OF ARGENTIFEROUS MANGANESE ORES.

Returns of the production of 17,550 tons of manganese-bearing silver ores have been received, all from Colorado. The

This table shows the production of what may be strictly regarded as manganese ores in the classification above given. It has been impossible in some cases to separate the manganese and manganiferous ores which are the product of a given mine, but where the total production of State or mine averages more than 44.252 per cent. of metallic manganese its production is regarded as manganese ores.

**Imports of Iron and Steel Ore.**—We present below a table, compiled from the monthly summary of the Bureau of Statistics of the Treasury Department, showing the quantity of iron and steel and iron ore imported into the United States in the first quarter of 1891 and 1890:

Articles. Gross tons.	March.	3 mos. 1891.	3 mos. 1890.
Pig iron.....	7,824	22,762	36,810
Scrap iron and steel.	4,856	11,706	13,256
Bar iron.....	770	4,037	5,350
Iron and steel rails.	.....	73	.....
Cotton ties, hoops, &c.....	.....	.....	898
Hoop, band or scroll iron or steel.....	31	138	1,552
Steel ingots, billets, blooms, &c.....	2,355	6,797	5,991
Sheet and plate iron or steel.....	1,496	2,978	1,958
Tin plates.....	45,167	97,644	70,302
Wire rods.....	4,800	13,031	14,043
Wire and wire rope.	693	1,528	646
Anvils.....	93	217	356
Chains.....	49	143	188
Total.....	68,143	161,054	151,350
Iron ore.....	49,381	261,910	412,117



## THE WEEK.

Baron Hirsch's fortune is variously estimated from \$100,000,000 to \$150,000,000. His father was a Bavarian banker. The foundation of his fortune was a railroad contract with the Turkish Government. It has since been enlarged by other railroad maneuvers in Eastern Europe and by speculations on the Paris bourse.

The Mercantile Library Association on Monday opened to its members the new Clinton Hall Building on Astor Place. The library of 235,000 volumes occupy the two upper floors, which are sufficiently commodious to meet all possible demands for many years to come. A softened light enters through a stained-glass ceiling, and the second tier of book cases is reached by an ornamented bronze gallery.

A Chicago dressed-beef concern have built a new slaughter-house, which is a marked novelty in structures of this sort. Instead of receiving the cattle on the ground floor they are driven to the roof of a four-story building by means of a long incline. On this roof there are 24 large pens, with a capacity for accommodating 100 head of cattle at one time. The roof is laid with block pavement, and is made perfectly tight by the use of tar and cement. The slaughtering is done upon the upper floor, the various steps in the dressing of the meat taking the carcass downward until it reaches the ground floor cooled and ready for shipment.

The failure of the Keystone Bank of Philadelphia is followed by the resignation of the city treasurer, who publishes a statement that \$1,300,000 of municipal and State funds have been lost, with no trace of their whereabouts. The mystery up to the present moment is unexplicable.

The North American Commercial Company, report says, have been prohibited from killing seals this season. Meanwhile a California company, under a contract with the Russian Government, expect to take 50,000 seals in the North Pacific, deriving a large profit. It is intimated that Mr. Blaine and the Secretary of the Treasury have unintentionally been acting at cross purposes in this matter and that a lawsuit may be the consequence.

California fruit canners have formed a combine, with \$2,000,000 stock.

The estimates of the Dominion Finance Minister, submitted to the Ottawa Parliament, show a reduction of \$5,000,000 for next year's expenses, the total being \$43,000,000.

Italians have difficulty in finding employment in New Orleans and are migrating to other cities.

The following figures are presented by Senor Romero to show how large a share the United States has in both the import and export trade of Mexico:

Imports into Mexico.		Exports from Mexico.	
1889.		1890.	
Value.		Value.	
United States.....	\$22,669,420	Great Britain.....	\$43,622,440
Great Britain.....	6,337,980	France.....	13,722,122
France.....	4,956,548	Germany.....	3,159,250
Germany.....	2,842,932	Spain.....	1,693,773
Spain.....	1,920,942	Other.....	534,057
Other.....	1,297,049		367,735
Total.....	\$40,024,894	Total.....	\$62,499,388

Senor Romero refrains, with diplomatic courtesy, from criticising the trade regulations of the country, but he points out the reasons which might tempt our Government toward the most liberal policy.

Contracts have been let in Glasgow for the construction of two steel ships for the Hawaiian trade. One of them is to be 3300 tons and the other 4000 tons, and

they will cost about \$100,000 each. They are destined for the carrying trade, and will ply between San Francisco, Port Townsend and the Hawaiian Islands. The Inter Island Navigation Company of Hawaii will be part owners, and shipowners in San Francisco will also be interested.

The duty on wheat has been reduced in France to 3 francs and on flour to 6 francs per hectoliter, for the period of August 1, 1891, to June 1, 1892.

Telegrams from Rio Janeiro say that, owing to the increase of exchange on London, the Brazilian Government's decree ordering that customs duties be levied in gold has been rescinded, but that the duties have been increased 5 per cent.

## The Coke Strike Ended.

The long strike in the Connellsville coke region is at an end and the men are making desperate efforts to regain their old positions. As will be remembered, the strike was inaugurated in February last over the refusal of the men to accept a reduction of wages, amounting to about 10 per cent. The wage agreement expired on February 9, last, and previous to that date the operators prepared a new agreement, calling for a reduction of 10 per cent., while the demands presented by the men called for an increase in wages of about 12 1/2 per cent. Neither side would recede from the position they had taken, and on the night of February 9 operations were suspended at all but a few of the 16,000 ovens, and the most bitter strike that has ever occurred in the Connellsville region was started. For about six weeks matters were very quiet, neither side making any move looking to the resumption of operations. On March 26, however, the H. C. Frick Coke Company and the McClure Coke Company, operating about three-fourths of the ovens in the entire region, posted at their works a sliding scale, under which, they stated, a number of their men wished to return to work. This was a sliding scale based on the selling price of coke, the minimum price being put at \$1.75 per ton, and was generally attributed to Andrew Carnegie, who is a large stockholder in the H. C. Frick Coke Company. This scale provided for a reduction of about 5 per cent. and was to continue in force until February, 1894, and stipulated that the company "shall at all times have the right to say how and when this plant shall be operated, and the right to employ any person or persons it desires to employ, and no others. Under this arrangement no such thing as a strike can occur and there can be no suspension of work by workmen for any cause during the term of this agreement without the consent of the management." The scale in full was printed in *The Iron Age* of April 2, 1891. Immediately after the presentation of this scale a number of mass meetings were held at which the scale was bitterly denounced by the men, and they declared they would starve before they would accept it. On the other hand, there were workmen who said they would accept the scale and return to work if assured of protection from the strikers. This was promised to the men, and for the purpose of giving it the operators had large numbers of deputy sheriffs guarding the different plants where operations had been partly resumed. Outbreaks were frequent, however, and these culminated in the riot at Morewood shaft on the night of April 1, at which seven men were killed and a number of others badly wounded. The State troops were then called out and the region was under military guard for some weeks. During all this time the efforts of the operators to start up the idle ovens were meeting with

considerable success, each succeeding week showing a gain of active ovens over the preceding one. Attempts were continually made by the strikers to induce the men at work to stop, but with little success. The labor leaders knew they were making a hopeless fight, and at a meeting held last week they addressed a communication to Thomas Lynch, general manager of the H. C. Frick Coke Company, asking for a conference.

To this request the following reply was made by the Frick Coke Company: We have nothing to conciliate or talk about. We have decided on a sliding scale, under which we propose to operate our works until February 1, 1894. To the extent that we have market for our products, we will start our works. Any of our former employees who wish to work under that scale and whom we have room for, can apply to the superintendent at the various works. We herewith hardy on a copy of the sliding scale, which will explain itself."

The receipt of this communication completely disheartened the strikers, many of whom were on the verge of starvation, and the order was at once given to abandon the strike and return to work. Applications are pouring in on the operators from the men for their old positions, and they are being put to work as fast as places can be found for them. Many of them, however, will be idle for some time yet, as it is the intention of the H. C. Frick Coke Company and the McClure Coke Company to only put a sufficient number of ovens in operation to supply the demands made on them for coke. The cost of the strike both to operators and men has been enormous, but the exact amount will probably never be known. The operators will, of course, be the heaviest losers, the amount running into the millions.

Now that the strike is ended, it becomes of interest to know at what price coke will be furnished by the operators. Notwithstanding that many statements have been made that another reduction would be made in the price, we can state that for the present at least the same prices will rule as were in force before the strike. These prices are as follows: Furnace coke, \$1.90; foundry coke, \$2.30; crushed coke, \$2.65; all in tons of 2000 pounds, on board cars in Connellsville region. This makes the prices delivered at the points named below as follows, in tons of 2000 pounds, f.o.b. cars in Connellsville region:

	Furnace coke.	Foundry coke.
Beaver Falls, Pa.....	\$3.15	\$3.55
Boston, Mass.....	5.90	6.30
Baltimore, Md.....	4.67	4.47
Buffalo, N. Y.....	4.15	4.55
Cairo, Ill.....	5.60	6.00
Carondelet, Mo.....	5.25	5.65
Cincinnati, Ohio.....	3.70	4.10
Cleveland, Ohio.....	3.60	4.00
Chicago, Ill.....	4.65	5.05
Detroit, Mich.....	4.25	4.65
East St. Louis, Mo.....	5.10	5.50
Indianapolis, Ind.....	4.65	5.05
Joliet, Ill.....	4.65	5.05
Milwaukee, Wis.....	4.75	5.15
Mahoning Valley, Ohio....	3.25	3.65
Pittsburgh, Pa.....	2.60	3.00
Shenango Valley, Pa.....	3.25	3.65
St. Louis, Mo.....	5.25	5.65
Toledo, Ohio.....	4.25	4.65

The above are the prices at which coke can be delivered at the points named under the present rates of freight. These are liable to be changed, however, as we have reliable information that a further reduction of freight rates is contemplated by the railroads. It is probable that this reduction will affect only points west of the Connellsville region. While the question has not been definitely decided, it is believed that a reduction will be ordered by the railroads. An announcement to that effect may possibly be made during the present week.

# The Iron Age

New York, Thursday, May 28, 1891.

DAVID WILLIAMS, - - - PUBLISHER AND PROPRIETOR.  
CHAS. KIRCHHOFF, - - - EDITOR.  
GEO. W. COPE, - - - ASSOCIATE EDITOR, CHICAGO.  
RICHARD R. WILLIAMS - - - HARDWARE EDITOR.  
JOHN S. KING, - - - BUSINESS MANAGER.

## Bar-Iron Makers and Jobbers.

Western jobbers of bar iron appear to have a well-founded grievance against the bar-iron manufacturers. They claim that, while their trade is considered desirable by the manufacturers, who are always anxious to get "jobbers' specifications," yet the same manufacturers will sell at a lower price to large consumers who make season contracts. The jobber will order certain sizes without regard to length, but the consumer will order every piece cut to a specified length in order to save waste. The jobber's order would certainly appear from this to be more desirable, as the mill is put to no expense for cutting to lengths. Orders have been known to be taken at very low rates for short pieces cut to the fraction of an inch, intended to fit perfectly as parts of machinery, but jobbers at the same time were unable to get their specifications accepted at rates on anything like an even basis. Further than this, shipments to jobbers are made of all lengths, and not infrequently it happens that short pieces are thrown in to make up the weight ordered which have apparently been left after orders to manufacturing consumers were filled. Cases are reported in which some of the bar iron received was immediately relegated to the scrap heap, because it was not merchantable on account of its shortness.

A jobber's scrap heap accumulates very rapidly when business is brisk, because so many customers will order from him pieces cut to length, and the waste is often quite considerable, but objection seems to be fairly made against a practice which causes the scrap heap to be swollen from entirely new stock. It is rather curious also that bar-iron manufacturers decline to make season contracts with jobbers as well as with manufacturing consumers. This is very probably because the bar-iron makers desire to keep the control of their own trade to a certain extent. With long time contracts they might sometimes find the jobbers serious competitors for orders with themselves and offering their own iron. In this particular the jobbers do not seem to have as good ground for complaint. They can virtually accomplish the same purpose if they have money to spare and warehouse room enough by ordering a large stock when prices are very low. In other respects, however, they appear to be discriminated against, even while their trade is rather anxiously cultivated.

With painstaking zeal our contemporary *The Railroad Gazette* has attempted to draw general conclusions from the figures

of cost of steel rails which were published in *The Iron Age* recently. We were particularly careful not to present any averages because the data which we published did not allow of their being made. The average yearly cost which our contemporary has tabulated is not the average of the monthly costs. The former can only be computed when the production for each month is given. Every mill manager knows that the cost for a month is apt to run up very quickly whenever, for some reason, the product has been small, and yet the high cost for one month might not affect the yearly average materially. For the same reason it is incorrect to draw a general average during a period of ten years, as the *Railroad Gazette* has done. In spite of the statement distinctly made by us that the cost of pig iron given covered only a part of the quantity entering into the manufacture of rails at the particular mill in question, our contemporary has tabulated the ratio of cost of rails to the cost of pig iron, and finds that it has been remarkably constant. The percentage of the product of pig iron for which the cost was given by us to the total output of rails has varied from year to year, so that the ratios of our contemporary are valueless. The *Railroad Gazette* has also tabulated the average prices and compares them with the cost. This too is unjustifiable, although our contemporary does remark that the averaged figures from actual sales would show a lower price. The diagram recently published in *The Iron Age* shows conclusively how widely realized prices differ from the averages of monthly quotations.

## The Coke Situation.

The final collapse of the coke strike will unquestionably have an important influence on the iron and steel trade throughout the whole country. As we report elsewhere, the Connellsville coke manufacturers have decided to maintain for the present the price of \$1.90 per ton which had been fixed previous to their struggle with their men. The Connellsville manufacturers evidently feel that they occupy a position of great strength, and seem inclined to demand what they insist is a fair return upon the capital invested in their business. Great iron and steel sections which until now have depended upon this small region for their fuel will protest vigorously that the policy chosen is dangerous to them in the long run. No one will deny that so far as quality is concerned the Connellsville product ranks first as a furnace fuel. It is a question for the consumers to decide how large the difference in price between the standard coke and that produced in other regions must be in order to warrant their choosing the latter. Furnacemen hold widely varying opinions on this point, but it is evident that the outside makers can make a liberal cut under the prices asked for Connellsville coke and yet retain a satisfactory margin of profit. In other words, the high price of Connellsville coke is a direct encouragement to independence on the

part of consumers and to rival districts. It should also give added impetus to the experimenting with improved methods of coke manufacture, allied with the utilization of by-products. The course taken by the Connellsville manufacturers seems to indicate the policy which they propose to adhere to, at least for the present. It indicates that at least in this direction the pig iron makers of the valleys have little to hope for in their struggle with the producers of the Birmingham and Sheffield districts. One consideration which is likely to influence the valley furnacemen in dealing with the question of resumption of work is that soon the consumption of mill iron will be reduced because the rolling mills close down for repairs in July. There is the danger, too, that there may be a struggle with the Amalgamated Association over the scale. With such contingencies to face, the temptation to blow in is not great.

A curious perversity exists among those who use plates and sheets. A boiler maker almost invariably calls his plates sheets, while those who handle thin sheets cut in very small sizes call them plates. The custom of calling a plate a sheet is of very long standing in the boiler-making trade, but appears to be only a shop term, as the boiler makers invariably call a plate by its proper name when sending an order to the manufacturer. The habit of calling a sheet a plate obtains particularly among those who make tin plate. The sheets used in making tin plate are mainly from 28 to 30 gauge and are clearly thin sheets, yet by the trade they are called "black plates." They are rolled in a sheet mill and by a sheet roller, but are not known as sheets by those who handle them. The finished product is not really tin plate but tinned sheets. This mixing of technical nomenclature can hardly be reformed, but will probably endure permanently as an example of the perversity of human nature which leads us to prefer the opposite of what we have.

## OBITUARY.

WARREN MURDOCK.

Warren Murdock, a retired iron merchant who 30 years ago held a foremost place in the iron business of this country, died Wednesday night, 20th inst., at his home, 33 Garden place, Brooklyn. He was born in Carver, Plymouth County, Mass., in 1809, his parents being direct descendants of a Puritan family. While a young man he engaged in the iron business in Boston, establishing the firm of Murdock & Bullard. In 1846 he went to Danville, Pa., where his elder brother, Bartlett Murdock, had founded the Montour Iron Works. The younger Murdock soon became superintendent and general manager of this company, and in 1854 was elected their president. Subsequently he organized the Peekskill Iron Company and served as their treasurer until 1860. In 1857 he removed to Brooklyn, and three years later retired from active life.

S. C. CLIFTON, superintendent of the wire mill department of the Beaver Falls Mill of Carnegie, Phipps & Co., Limited, at Beaver Falls, Pa., died at that place on Saturday, May 23, of lung disease, superinduced by the grip. He leaves a wife and two children.



### Annual Convention of Mechanical Engineers.

The American Society of Mechanical Engineers will hold its annual convention in Providence during the week beginning June 15. The arrangements in Providence are in charge of a local committee, of which Henry Du Villard is chairman. This committee will be assisted by a sub-committee of 10 from the Advance Club, and it is also projected that a citizens' committee of 100 be appointed to make the reception and entertainment of the delegates worthy of the city and the occasion.

On Tuesday morning, June 16, the session will be opened by an address of welcome by Charles Sydney Smith, the Mayor of Providence. After a reply by the president of the society the following papers will be read:

Norris, R. Van A.: "Two Rope Haulage Systems." Halsey, F. A.: "The Premium Plan of Paying for Labor." Henthorn, J. T.: "Test of a Triple-Expansion Engine." Watt, S. P.: "A Belt Dynamometer." Alden, G. I.: "A New Belt Testing Machine."

On Tuesday afternoon a special train will leave the Union Station at 2.30 o'clock to convey the members to the Gorham Company's works at Elmwood. The train will return at 4.17 p.m. and a visit will be paid to the Nicholson File Company and Rhode Island Locomotive Works.

During the second session, on Tuesday evening, at St. John's Hall, professional papers will be read as follows: Wood, De Volson: "Flexure of Thin Elastic Rings."—Topical query No. 84. Carpenter, R. C.: "Applications of Hirn's Analysis to Engine Testing."—Topical query No. 85. Peabody, C. H.: "Applications of Hirn's Analysis to Multiple Engines."—Topical query No. 86. Carpenter, R. C.: "Notes Regarding Calorimeters."—Topical query No. 87. Webb, J. B.: "Jet Propulsion."—Topical query No. 88. Webb, J. B.: "Performance of a Steam Reaction Wheel."—Topical query No. 89.

On Wednesday morning there will be read: Royse, Daniel: "Heat Transmission through Cast-Iron Plates Pickled in Acid."—Topical query No. 90. Thurston, R. H.: "Steam Engine Efficiencies."—Topical query No. 91. Bird, W. W.: "Effect of the Steam Jacket on Cylinder Condensation."—Topical query No. 92. Rogers, W. A.: "Method of Dividing an Index Plate into 1000 Equal Parts." Rogers, W. A.: "A Machine for Cutting Perfect Screws."—Topical query No. 93. Gantt, H. L.: "Steel Castings." Howe, H. M.: "Manganese Steel."

On Wednesday afternoon at 2.30 o'clock, the members will take conveyance from the Narragansett Hotel for the Wm. A. Harris Steam Engine Company, the Brown & Sharpe Mfg. Company and the Armington & Sims Engine Company.

On Wednesday evening a reception will be tendered to the society by the citizens of Providence.

At the fourth session, on Thursday morning, the following papers will be presented: Jacobus, D. S.: "Comparison of Economy of Compound and Single-Cylinder Corliss Engine." Denton, J. E.: "Performance of a Pumping Engine Against a Head of 2000 feet of Water." Gordon, F. W.: "A Blast Furnace Blowing Engine." McBride, Jas.: "Some Experiments with a Screw Bolt." Roney, W. R.: "Mechanical Stokers."

The following is a list of the topical questions to be discussed:

84. What limits are there to the speeds of a hot-air or caloric engine? What is the least and the greatest number of revolutions per minute about which you know in such engines?

85. How many times per minute can a dash-pot apparatus be lifted, such as is used with Corliss' valve gear?

86. Which is better economy in a foundry cupola—to melt rapidly, producing a relatively cool iron, or to melt more slowly, producing hotter iron?

87. Have you had any experience in outdoor work at night, in wind and storm, with portable apparatus for light in large quantities, other than electric light?

88. What is the best design for line shafting, transmitting over 50 horse-power, permitting them to be stopped and started on any floor without interfering with the motor or other shafting?

89. What is the best method of correcting for the superheating of steam in figuring a boiler test?

90. In arranging chimney stacks for a battery of boilers, is it best to use one for each pair or a larger chimney for the entire battery?

91. Will there be any difference in the size of the chimneys required when the boilers are the ordinary tubular type or of some of the water-tube forms?

92. What is the best form of cylinder lubricator for engines carrying 140 pounds of steam pressure or over?

93. What are the maximum safe speeds for hoisting and traversing in an overhead travelling crane, in a machine shop?

94. Is there any advantage in using a circulating device for the water inside a boiler, particularly of the three-furnace Scotch form?

95. Is there any best way to group the tubes over the cylindrical furnaces of a Scotch boiler?

96. Can a water pyrometer be made to work successfully for high temperatures?

97. Will a forced circulation of air under a floor near the ground prevent decay of the wood work and floor timbers?

98. Why should any one cut a  $\frac{1}{2}$  inch bolt with 12 threads to the inch? Is there any objection to the United States Standard of 13 threads?

99. Have you any facts to show that there is a molecular change in metals when their temperature is raised or lowered?

On Thursday the delegates will sail down the bay on the steamer Day Star to Rocky Point, where they will be initiated into the mysteries of a Rhode Island clambake. After they will have feasted the steamer will sail around Mount Hope Bay and afterward proceed to the Torpedo Station at Newport, where an exhibition of the use of torpedoes has been arranged for by the commandant of the station. The torpedo boat Stiletto will take part in the exhibition. After a sail around Beaver Tail and through Newport Harbor, the Day Star will return to Providence.

On Friday the delegates will visit the Corliss Steam Engine Company, the Rhode Island Tool Company and the American Screw Company. In the afternoon they will go to the Pawtucket Water Works, where they will be turned over to a Pawtucket committee, who will banquet them. The event will also be celebrated by the official testing of the new pumping engine of the Pawtucket Works. The headquarters of the society during the convention will be in Room B, Narragansett Hotel.

The machine shops, the blacksmith shop and other buildings of the New York Central Railroad, at West Albany, N. Y., were destroyed by fire on the 21st inst. The loss is estimated at \$150,000.

A freight agent says the present extremely low rates by lake and rail for grain to Eastern points from the various lake ports must soon affect the rates for merchandise.

### RANDOM SHOP NOTES.

It is always a pleasure to visit the

**Straight Line Engine Company.**

of Syracuse, N. Y., and interview the founder of the concern, Prof. John E. Sweet. The company are now comfortably settled in their new shop, which, like the engine made within its walls, differs very essentially from ordinary practice. The first, and perhaps strangest, point of difference we find cut in the stone arch over the main entrance in the words "Visitors Always Welcome," which certainly contrasts with the legend we find over the door of another concern not far from Erie, and which warns the intending visitor as follows: "Please keep out and avoid the unpleasantness of being put out."

To the left of the entrance is the business office, while to the right is the engine room containing one of the Straight Line engines driving the works. Next to the office is the Professor's room. We were going to say private room, but the instant the visitor enters the works he finds that he is cheerfully and thoroughly welcome, and that there is nothing private in methods, processes or work from one end of the establishment to the other. Next to the Professor's room is the drafting room, these rooms being shut off from the shop, of which they occupy one corner, merely by a low railing. Next to the drafting room and occupying the other corner of the building is the assembling and testing department, from which the engines are delivered. The work passing through the shop is handled as little as possible, and as it gets to this end the parts are assembled, and the machine tested and delivered.

Identified with all Straight Line engines is the boring machine designed by Professor Sweet, which bores the cylinders and bearings at the same time, and which is so constructed as to insure the utmost accuracy. Our readers are familiar with the fact that the frame of the Straight Line engine is in the form of a Y, the stem forming the cylinder and guides, while the bearings are in the outer ends of the branches. The machine by which the boring is done has a T-shaped bed carrying down the stem of the T a boring bar which bores and faces the cylinder, and carrying parallel with the crosshead of the T a second boring bar, which bores and faces the journals. The construction is exceedingly simple, and it is evident that the bearings can be bored absolutely at right angles to the axis of the cylinder every time. This machine is an old standby, and has done much of the excellent work which has helped to make the Straight Line engine famous. The usual method of grinding the twist drill on a curve is not followed in this shop. For about one-third the width of each web the drill is ground straight, similar to a chisel point, the same angle as now common—58°—being preserved. The outer portion of the web for the first or inner part of it is cut parallel with the outside of the drill. This drill cuts rapidly, and it has been found when cutting in the solid that when it breaks it breaks at the elevation made where the two lines of grinding meet. The point seldom or never breaks. It is further found that when the break occurs it chips out a piece, but the drill does not "fall down," as is ordinarily the case when ground in the old way, and the hole is not liable, therefore, to be filled up with closely packed bits of the drill.

Passing through the shop, Professor Sweet picked up what looked to be two concentric tubes, one fitting within the other, about 3 inches long,  $\frac{1}{4}$  inch thick each, and the inside diameter of the outer

one about  $1\frac{1}{4}$  inches. These measurements are only guesswork, since the exact measurement is not essential to what we have to say. Putting the edge of the outer tube on the bench and taking a hammer handle and pressing down on the inner tube, it was possible to force out the smaller tube. He did this in several cases and then interchanged the tubes, picking them out at random and fitting them together. In every case it was found that the fit was a decidedly snug one. When asked as to the allowance made in the making of these tubes the answer given was that nothing over one quarter of a thousandth would pass. We may add that the inner one of these tubes is intended to fit a projecting stud in the cross-head carrying the valve rod. The end of the eccentric rod clasps the outer tube, the tubes therefore moving one upon another, the slide motion being due to the rise and fall of the outer end of the eccentric rod.

Drills and tempered tools are ground on the grindstone, since there is then no possible danger of drawing the temper. Moving up and down the side of the shop from the assembling part back to the rear is a hand traveling crane of 5 tons capacity, which has been found to admirably answer all requirements. The shop is well lighted, there being no portion requiring even on the darkest days any artificial illumination.

Upon leaving the shop we noticed that the new stack was braced by means of four girders extending up the sides. Each girder was a lattice, being perhaps half the width of the stack at the bottom and extending to a point about half way up. It avoids the use of guys, which are a nuisance and unsightly.

#### Bradley & Co.

of Syracuse, N. Y., have just rebuilt and extended "vertically" a portion of their extensive works. The new part was designed and erected under the supervision of S. E. Loring, consulting architect, of Buffalo. It embodies many new and important features in so-called slow-burning construction. The posts, stringers and floor beams carry the entire load of the building, the walls serving, as it was expressed, merely as an overcoat to keep out the weather, since they bear no weight beyond their own dead load. The posts are built up of 2-inch planks nailed together, the joints being spaced so as to form one continuous post from the foundation to the roof. The stringers and floor beams are built in the same way, and the floor beams are so spaced as to leave no pockets out of range of the automatic fire extinguishers, which are distributed throughout each room. We trust in an early issue to present full and complete drawings showing the improvements made and the method of construction here followed.

#### The Goulds Mfg. Company

of Seneca Falls, N. Y., whose pumping machinery is well-known, have a unique method of testing their Triplex pumps. This pump, as our readers know, consists of a shaft formed with three cranks, to each of which is connected a rod driving a plunger. On one end of this shaft is mounted a gear wheel with which engages a pinion on a second shaft driven by a belt over a pulley. In testing this pump the pinion shaft is first put in place and driven, the amount of power required to drive it being measured by a current of electricity needed to operate the motor by which the pinion shaft is driven. An excess of current shows that there is undue friction somewhere in this pinion shaft, and that is corrected before the test progresses any further. This part being brought to the standard, the crank shaft is next mounted and the power required to

drive it then ascertained in the same way. Following this the cylinders are then provided with their plungers and the connections to the cranks made, and the whole thing tested and arranged until the power required to drive the pump empty is brought down to the standard established. The method has been found to give admirable results and to be very simple and accurate in operation.

Part of the power required to operate these works is furnished by water driving turbine wheels. A very simple electrical apparatus serves to control the amount of water admitted to the wheel. A small ball governor is driven from the main shaft in one of the shops near the wheel pit. The rise and fall of the governor balls serves to bring a point in contact with one or another of two electric circuits. The current, according to whether it is in contact with the upper or lower point, passes in one of two directions. Near the wheel is a double ratchet wheel, with each of which engages a pawl mounted on a rocking lever, the upper end of which carries a flexible iron strip. These two strips extend in opposite directions like the cross bar of the letter T, of course there being independent stems to which the dogs are attached. An oscillating motion is given to each of these levers by a wheel provided with an eccentric pin, to which a connecting rod is attached. Just at the end of each of these strips is placed an electrical magnet. When no current—that is, when the governor is at the natural point—passes through these magnets, the strips do not strike them and the dogs are held away from engagement with their respective ratchet wheels. Then the oscillation goes on without producing any effect, but when the current by the falling or rising of the governor balls is passed through one of the electro magnets the strip is held in contact with the magnet, along the face of which it is drawn during the oscillation. The instant it is held in contact with the magnet the pawl attached to this particular strip is brought into engagement with its own ratchet wheel, which is thereby revolved, and by means of a screw arrangement the gate controlling the flow to the wheel is more or less opened or closed. The reverse movement of the governor balls sends the electric current through the other magnet and the other flexible strip is held in contact with that magnet and the pawl producing the reverse motion is brought into contact with its own ratchet wheel and of course the reverse motion of the gate is effected. The method has been found to work admirably and is so simple in construction as to require no attention whatever. Two or three cells of ordinary battery are all that are need to operate it, since the only work done by the electric current is to hold the flexible strip in contact during the operation, the real work of opening or closing the gate being effected by the crank and its connections.

The contract of Coxé Bros. with the Reading Company is said to provide that Coxé Bros. shall send all tidewater Coal over the Reading, guaranteeing a minimum business of 1,000,000 tons annually; that Coxé Bros. shall have a rebate of 70¢ a ton as an arbitrary on their 41 miles of railroad now under construction, and that Coxé Bros. shall deliver the Coal in solid trainloads and pay all expenses of unloading and shipping. The contract names October 1 for it to take effect, but a member of the firm says it may be January 1 before the new road and other things are ready.

Samson Fox of Leeds, who is interested in the manufacture of pressed steel car frames at Joliet, is now in this country.

## Washington News.

(From Our Regular Correspondent.)

WASHINGTON, D. C., May 23, 1891.

The final tests of the projectiles furnished by the Carpenter Steel Company of Reading, Pa., at the Annapolis proving grounds have been made with very satisfactory results. The tests were with 6 and 8 inch all-steel plates, backed, as usual, by 3 feet of oak timbers strongly braced with timbers resting against stone foundations.

In the test of projectiles, the object being the breaking up of the missiles on the plate without penetrating it, there is a difference of velocity as compared with the test of plates. In a plate the test velocity is 25 per cent. greater than in the test of a projectile. A 6-inch shot of 100 pounds is estimated to strike with a pressure of 28,000 pounds.

Where the material is soft the projectile becomes battered or flattened, or, if too hard, crushed to pieces. If the quality is satisfactory it is expected to pierce.

About a year ago the Navy Department awarded the contract for furnishing projectiles to the Carpenter Company. To date three deliveries on account have been made and accepted. The Department is entirely satisfied thus far with the character of projectiles being furnished by this company. In the recent tests the shot completely penetrated the 8-inch all-steel plate. In a conversation on the subject, giving the tests a utilitarian interpretation, it was mentioned that one of the test plates, compound, was made in England and of the same character as used on the armor of the English and Italian war ships, or 11½ inches thick, with oak backing 3 feet thick. In a series of earlier tests in the plate represented here in compound 11½ inches thick, the central hole shows the effect of the strike of a 10-inch steel projectile weighing 500 pounds. The front of the plate was much broken and damaged, but the shot lodged in the plate. The abrasions on the plate were made by projectiles of various steel companies of the United States who entered into the competitive tests over a year ago. The hole above and to the left was made by a French projectile of 100 pounds. The shot very nearly penetrated through the plate. The three holes marked 1 show clear penetrations by projectiles of the Carpenter steel. The main interest of this plate is as a trial plate of competitive tests showing the progress made in the manufacture of steel in the United States.

The comment on the results of these tests was to the effect that the United States has a projectile which will pierce the armor used in the British and Italian armored ships when fired from one of the new high-power guns of the United States navy. The difference in the caliber of guns on the Charleston and the Chilean armored vessel Esmeralda is considered as more than made up by the difference in the quality of ordnance, the Charleston's 8-inch guns with improved projectiles being considered equal to the Esmeralda's 10-inch English guns.

The Interstate Commerce Commission, it is reported from Washington, entered suit against the Lehigh Valley Railroad Company in the United States Circuit Court for the Eastern District of Pennsylvania ten days ago. The suit is brought because of the failure of the railroad to comply with the ruling of the Commission in the Coxé Brothers & Co. case. An appeal to the Supreme Court is considered probable. In such an event the Lehigh Valley would act in behalf of all the Coal-mining and carrying railroads. The case is expected to reach an early conclusion in the court where it is now on trial.



## MANUFACTURING.

### Iron and Steel.

Lucy Furnace No. 2 of Carnegie, Phipps & Co., Limited, at Pittsburgh, resumed blast last week. Both stacks of this firm in the above city are now in active operation.

Wm. Swindell & Bros., engineers and contractors, of Pittsburgh, have recently completed the erection of a 7-ton open-hearth furnace and one improved gas producer for the Trenton Iron and Steel Company of Trenton, N. J. The furnace was erected for the manufacture of special steel castings. For the Atkinson Steel Company of Chicago the firm have completed the erection of a 10-ton open-hearth furnace and two improved gas producers. This furnace is to supply the Atkinson Spring and Steel Works of Chicago with spring steel. For the Johnston Company, at Johnstown, Pa., they are erecting a 7-ton open-hearth furnace for steel castings and two improved gas producers to supply the 7-ton open-hearth furnaces and annealing furnaces.

At Pittsburgh last week Judge Stowe refused the motion for a new trial in the case of Ralph Bagaley against the Pittsburgh and Lake Superior Iron Company, in which a verdict of \$21,000 for the plaintiff had previously been given.

The foundation for a new boiler house for H and I furnaces of Carnegie Bros. & Co., Limited, at Braddock, Pa., has just been completed. The new boiler house will contain a battery of 16 boilers, making a total of 154 boilers that will be in use at the blast furnace plant of this firm.

Some time since we made an announcement to the effect that the Oliver Iron and Steel Company of Pittsburgh had purchased the Edith blast furnace in Allegheny, Pa., formerly operated under lease by the Monongahela Furnace Company of McKeesport, Pa. The purchasers have made application for a charter for the Allegheny Furnace Company. The incorporators are Henry M. Oliver, Jas. B. Oliver, D. A. Oliver, Geo. F. Tenner and C. D. Fraser.

The plant of the Allegheny Bessemer Steel Company, at Duquesne, Pa., recently purchased by Carnegie Bros. & Co., Limited, of Pittsburgh, will be started on the manufacture of rails during the present week. Since the purchase of the plant by this firm it has been running exclusively on billets. It is understood that the mill will continue on steel rails as long as the orders will justify it.

The structural department of the American Iron and Steel Works of Jones & Laughlins, Limited, of Pittsburgh, was destroyed by fire on Wednesday, May 20. The department was under a frame structure 200 x 280 feet, and was totally destroyed, the loss being estimated at \$50,000. Among the contracts which will be delayed by the fire is one floor of the 17-story Masonic Temple, Chicago. The work of rebuilding the plant has already been commenced.

At the Upper Union mills of Carnegie, Phipps & Co., Limited, at Pittsburgh, H. W. Borntrager, manager, has reconstructed the puddling furnaces so that they can use either coal or natural gas as fuel. It is expected that this arrangement will do away with the inconvenience resulting from a shortage of natural gas.

No. 2 furnace of the Dunbar Furnace Company, at Dunbar, Pa., was banked down on February 28 last owing to a scarcity of coke occasioned by the strike. The Parrish Coke Works supply a little more than half the amount of coke required for this one furnace. Work at this plant has been resumed with non-union labor, the men being paid in accordance with the terms of the Frick sliding scale. All the ovens were finally charged on the 9th inst. The blast was put on the furnace on the evening of the 13th inst. and everything is working very smoothly. The furnace laborers resume work at a general reduction of 10 per cent. The furnace is now running on the product of the Parrish ovens and the stock of coke accumulated during the time of the strike.

The Sharon Furnace Company of the Sharon Iron Company, at Sharon, Pa., have been banked down since February last on account of the strike in the Connellsville region. The firm feared that the furnace would not be in shape to blow in again, and last week put on the blast for a few days in order to warm it, but the furnace has been banked again and will probably not be put in blast permanently for some time to come.

Both furnaces of the Troy Steel and Iron Company, Troy, N. Y., have fully recovered from the effects of the shutdown caused by the

engine house fire some weeks ago, and are now running nicely. The blast was put on No. 1 stack on Monday morning, and No. 2 followed Tuesday evening.

The bondholders and stockholders of the Woodstock Iron Company met at Anniston, Ala., May 20 and 21. Over two-thirds of the stock was represented in person and by proxies. The following Board of Directors were unanimously elected: C. B. Probst, New York City; Dr. H. M. Caldwell, of Birmingham; John W. Noble, Anniston; A. L. Tyler, Anniston; Wm. Noble, Anniston; T. J. Bush, Anniston; T. H. Aldrich, Blockton, Ala.; W. G. Leadbetter, Anniston; T. F. Howell, Rome, Ga. C. B. Probst was elected president and Stephen N. Noble general manager. The Executive Committee is John W. Noble, T. J. Bush and W. G. Leadbetter. Efforts will now be made to put the two coke furnaces and the two charcoal furnaces in blast as soon as it is possible to arrange contracts and supplies upon a more economical basis than has heretofore existed, and to place the business upon a paying footing.

Gordon, Strobel & Laureau, Limited, have just closed a contract with the Topton Furnace Company of Topton, Pa., for a plant of two chimney-top fire-brick stoves; also new bustle-pipe tuyere stocks, gas mains and downcomers.

The Holcomb-Brown Iron Company have purchased the property and plant formerly owned by the Iowa Rolling Mill Company of Burlington, Iowa. The entire property and plant of the latter company was recently purchased by John F. Holcomb, who has associated with him Richard Brown of Youngstown, Ohio (one of the founders of the old firm of Brown, Bonnell & Co. and of the Mahoning Valley Iron Company), and some of the stockholders of the former company, and also H. G. Hamilton, a rolling-mill man, who will have charge of the manufacturing department. The capacity of the mill has been increased by the addition of two heating furnaces and by putting in a 5-ton steam hammer. The company will make a specialty of the Star brand of horseshoe bar. The company are in the market for all kinds of wrought-iron scrap.

The main building of the company recently organized, with a capital of \$100,000, to erect bolt and nut works at Curtis Bay, Md., will be 250 x 70 feet. The buildings will be of brick and corrugated iron.

The Lehigh mill of the Allentown Rolling Mills at Allentown, Pa., went into operation on the 19th inst. as a spike and puddle mill. This mill has been idle several years and was formerly used in the manufacture of bars, angles and girders.

Repairs to the Belmont Furnace at Wheeling, W. V., will be completed and the furnace in operation in another week.

A blast furnace is to be erected at Buffalo, N. Y., on the site of the old Union Rolling Mill. Julian Kennedy of Pittsburgh has prepared the plans.

The Allentown Iron Works at Allentown, Pa., has lighted stack No. 5, erected within the past year.

It is announced that a plant for the manufacture of iron and steel on a large scale will be erected at Harrisburg, Pa., within the next six months. The enterprise is projected entirely by local capitalists.

A large force of men have been put at work on the plant of the South Boston Iron Works, at Middlesborough, Ky., and the works will be pushed to completion.

The Henderson Steel and Mfg. Company of Birmingham, Ala., are making arrangements to complete their second furnace and to construct a blooming train.

The Isbell Land Company have been organized at Isbell, Ala., with a capital stock of \$250,000, and, it is stated, have purchased 2100 acres of mineral and town site property in Franklin County, and will develop and erect iron furnaces and other manufacturing industries.

It is reported that the Talladega Iron and Steel Company, at Talladega, Ala., will issue \$300,000 of bonds in order to make extensive improvements on their furnace, which will be put in operation under a new management.

The plant of the Pennsylvania Construction Company at Uniontown, Pa., was sold at sheriff's sale on Saturday, 23d inst., to Jno. A. Butz, the former manager. It is reported that Mr. Butz will put the plant in operation some time during next month.

At Youngstown, Ohio, on Saturday, the 23d inst., an attempt was made to sell the plant of the Lancaster Iron Company of Lancaster, Ohio, the property having been appraised at

\$42,500, but as no bids were made the sale was indefinitely postponed. Several creditors of Lancaster, Ohio, where the plant is situated, have filed a motion in court, praying that the order of sale be set aside and a receiver appointed. It is alleged that the steps which have been taken were not known by the parties seeking to have the sale prevented.

The blast furnace of the Riverside Iron Works, at Benwood, W. Va., which has been idle since February, on account of the coke strike, has resumed operations.

Sam'l. W. Hay, agent for Pittsburgh and vicinity for the Brightman Stoker Company of Cleveland, Ohio, has secured an order for 14 stokers to be placed on boilers being built by Riter & Conley of that city for the West Superior Iron and Steel Company of West Superior, Wis.

### Machinery.

The Trethewey Mfg. Company of Pittsburgh recently shipped to the Edison shops of the North Pacific Railway Company at Tacoma, Wash., a 3000-pound steam hammer. The weight of the hammer was about 20 tons.

The Hurley Machine Tool Works, Richmond, Ind., write under date of 19th inst. that present prospects of an increased demand for their Shellenback pulley lathe are so flattering as to lead to the contemplation of enlarging their present productive facilities.

Warren Webster & Co. of Philadelphia are making steady progress in introducing their vacuum exhaust steam economizer. They recently shipped three to Europe and have now under construction four of 2000 horse-power, one of 1700 horse-power, three of 800 horse-power, three of 1000 horse-power, besides a number of smaller sizes. Most of the leading rolling mills are using this economizer, in some instances have duplicated their orders, and in others have ordered economizers of larger powers.

The Hooker-Colville Steam Pump Company report the sale of a large size artesian pumping engine to be shipped to Springfield, Mo., and two large size boiler feed pumps to the Lindell Railway Company, St. Louis. They report a heavy demand for their specialties and are pushed to keep even with orders.

The well-known Forster Rock Breaker is described in a handsomely illustrated catalogue just issued by the Totten & Hogg Iron and Steel Foundry Company of Pittsburgh, Pa. The principal difference in this machine from the ordinary rock breakers lies in the fact that the latter crush the stone by a direct jam, while this is the only machine where the dies nip the stone and produce a fracture similar to that of a hand hammer, leaving the broken pieces just as solid as the original rock. The machine is very simple in construction and very solidly built. The above concern also manufacture sand rolls and pinions of either iron or steel, chilled rolls, trains for structural shapes of iron or steel, blooming mills, shears, squeezers, &c.

The Ball Engine Company of Erie, Pa., have just issued a list of the users of their celebrated engine, and a book containing some of the testimonial letters they have received. Upon inspection of the list we find that this engine is well known to all of the electric light companies, by whom it has been widely adopted. This is due to the fact that these engines are compact, finely finished, are economical in fuel consumption and very perfect in regulation.

D. Saunders' Sons of Yonkers, N. Y., have just presented a fully illustrated catalogue of their hand tools for cutting and threading steam and gas pipe. This brings the tools made by the company down to date and shows all the latest improvements and modifications made by them. The catalogue is handsomely gotten up, the engravings are very plain, and the description as complete as may be desired.

The Austin Automatic Boiler Feed, manufactured by H. McDonald of Bellefontaine, Ohio, is described in a catalogue just issued. With this device the water is fed into boilers automatically and by gravity. The feeders are claimed to be unfailing in their action. It will feed hot as well as cold water.

The Skinner Chuck Company of New Britain, Conn., have just issued a catalogue which they say is the largest, most complete and comprehensive catalogue of chucks ever published. It illustrates and describes over 400 sizes and styles of lathe and drill chucks made by them. So complete has the work been done that it has been copyrighted by the publishers.

The Ball Engine Company of Erie, Pa., owing to a large increase in the demand for their automatic cut-off engines, have been compelled to erect a large addition to their

works, which will nearly double the present capacity. This extension will be equipped with special tools for the manufacture of their engines. In this extension they will set up their large engines, the building being designed and equipped with special reference to heavy work. The types now built by this company are single cylinder, cross-compound, tandem compound and triple expansion, and also special vertical engines arranged to be directly connected to the dynamo and suitable for electric lighting on ships, &c.

The manufacture of a newly invented water wheel is to be commenced at Dexter, Maine, by Witham Bros. & Co.

E. T. Barrow's screen factory, Portland, Maine, which was recently burned, is being rebuilt.

The Jeffrey Mfg. Company have opened an office and salesroom at 48 S. Canal street, Chicago, where they will keep on hand a large stock of sprocket wheels and a full line of roller and detachable chain belting and all their special appliances for the rapid handling of materials either in package or bulk. Their specialties include all kinds of conveyors and elevators for handling coal, ores, grain, stone, coal pillars and railroad coaling stations. The Jeffrey drill and coal mining machines are operated either by electricity or compressed air. The shops from small beginnings now cover 5 acres, and owing to the rapid increase of their business they have recently purchased 3 acres adjoining their works, on which, during the coming summer, they will erect additional shops. John H. Gregg, who has a wide experience in their special line, is the engineer in charge of the Chicago branch.

The new brick foundry of the Atherton Company at Lowell, Mass., built to replace the one recently destroyed by fire, has been completed, and is to be fitted with three furnaces capable of melting 25 tons of metal. The number of molders is to be increased from 30 to 50 as soon as the floor space can be fitted up. The main foundry is 150 x 60 feet, the brass foundry 30 x 22 feet, and the core room and annealing room 30 x 22 feet and 18 x 22 feet respectively. Many orders are on hand for Southern mills.

J. M. Williams & Co., iron founders, of Hamilton, Canada, have assigned.

The Southern Mill Supply Company have been incorporated at Savannah, Ga., to manufacture mill supplies and machinery. The capital stock of the company is \$50,000.

Weber Brothers will erect a foundry at Clinton, Mo., 150 x 60 feet.

The McCommack Iron and Boiler Company of Albany, N. Y., manufacturers of the Heine boiler, will erect a plant at Hudson, N. Y., and move their works to that place.

The F. J. Meyers Mfg. Company of Covington, Ky., contemplate establishing a branch works at Chattanooga, Tenn., for the manufacture of architectural iron work.

The blacksmith and machine shops, together with valuable machinery, of the New York Central Car Works, at West Albany, N. Y., were destroyed by fire on the 21st inst. The loss is placed at about \$200,000, mostly covered by insurance.

The Limerock Railroad Company will erect an engine house and machine shop at Rockland, Maine.

The John Stephenson Car Company of New York have purchased land near Larchmont, on the New York and New Haven Railroad, and will erect extensive car works there.

L. Schutte & Co. are to erect a factory and machine shop at Twelfth and Thompson streets, Philadelphia. The building is to be 80 feet square and six stories high, with a basement.

The machine shops and bolt department of the Knoxville Iron Company at Knoxville, Tenn., have been destroyed by fire.

Efforts are being made by local parties at Dexter, Maine, to re-establish the Dexter Machine Company with new capital and new management.

Seaman, Sleeth & Black, proprietors of the Phoenix Roll Works of Pittsburgh, have just completed a pair of rolls which are the largest they have ever made. The length of the rolls over all is 25 feet 5 inches, and on the face 23 feet 2 inches, and 24 inches in diameter. These rolls are intended for a hydraulic machine for bending keel plates at the Mare Island Navy Yard.

#### Hardware.

The Parry Mfg. Company, Indianapolis, Ind., report an excellent demand for their No. 70 wagon and state that not the least of its many meritorious points is that of the welded tire on the felloes, preventing the tire from

coming off under all conditions. Their road cart business still keeps up to its usual standard. Another popular specialty of theirs meeting with excellent success is the Parry gear, which is shipped knocked down.

Anthony Wayne Mfg. Company, Fort Wayne, Ind., write, under date of 19th inst., that the demand for the Anthony Wayne and Western Star washing machines is entirely beyond their most sanguine expectations, the present month's orders already booked being very largely in excess of any previous month.

On the 18th inst. the inserted tooth circular saw department of E. C. Atkins & Co., Indianapolis, Ind., fronting 120 feet on South street, was seriously damaged by fire, caused in starting up one of the forges in that department, the loss closely approximating \$15,000, fortunately fully covered by insurance. A considerable stock of the goods made in the building destroyed was stored in company's warehouse, so that there will be no interruption in the filling of orders. The work of rebuilding will be commenced at once. The general business of the company is reported as being very satisfactory.

The Udell Woodenware Works, A. A. Barnes, proprietor, North Indianapolis, Ind., now occupy 8 acres of land adjoining the Cleveland, Cincinnati, Chicago, Indianapolis and St. Louis Railroad Company's tracks, the most of which is or will be covered with buildings; the old buildings will be remodeled and new ones added. The main structure will be in the form of an L, 162 x 232; engine room 60 x 60; dry kilns (two) 32 x 80; saw mill 84 x 56; the latter furnished with its own motive power, and other buildings already up. A new addition has recently been completed to their warehouse 12 x 120, in which goods for their New York branch are stored exclusively. New engines and boilers will also be added as soon as buildings are ready; the changes and additions will cause no interruption to the business of the company, who now have 175 hands on their pay roll.

W. E. Lape, formerly with the Porter Mfg. Company is equipping a shop at 235 and 237 Walton Street, Syracuse, N. Y., with new and improved machinery for the manufacture of lawn mowers and hardware specialties. Mr. Lape is a member of the American Society of Mechanical Engineers and has had a large experience in manufacturing.

#### Miscellaneous.

Shultz Belting Company are busy in all their departments. A few days since they shipped to a point in England 6000 feet of flat leather belting and 550 feet of their patent woven leather belting. Referring to their woven leather belting, they advise us that of 400 belts sent out only one was returned, the balance having been accepted and paid for.

The Tri-State Can Company of Keokuk, Iowa, who were burned out in February last, are rebuilding their plant on a much larger scale than before. The space formerly occupied by the warehouses will be utilized for additional factory room and new warehouses will be built. The new plant is being pushed forward with all speed and will soon be in complete operation.

The Prince Metallic Paint Company, Chicago, Ill., have opened an office at 517½ Chestnut street, St. Louis, Mo., for the sale of their well-known metallic paints, E. Steinhäuser, the vice-president, being in charge. This concern manufacture five different colors of paints—namely, two shades of brown, a red, a steel blue and a black. They issue a circular describing the paints and the forms in which they are put up. These circulars will be sent on application.

The Anniston Pipe Works lease to Brown, Gamble, Dimmick and other Cincinnati and Philadelphia parties is reported as effected, which will soon put the works in operation again.

Main Belting Company of Philadelphia are running very full on orders for their belts, which are used in nearly all large establishments that use power in all parts of the Union. Their order books show that belts have been shipped recently to all parts of the Union, from Georgia to Maine, and from Minnesota to Louisiana. The special features claimed for these belts are that they are less expensive than other large belts, are stronger and have greater traction power, and are not affected by heat, steam or water.

The Dominion Wire Company, at Lachine, Canada, in co-operation with a company in the States, who roll down the pure lake copper into rods, have enlarged their works to a capacity of 61 tons per day of electric copper wire, the first of the kind in Canada. In addition, the company manufacture all kinds of steel and iron wire, also barbed wire for fencing, brass wire, hay-bale ties and brass and steel wood screws.

The plant of the Pittsburgh Reduction Company of Pittsburgh, manufacturers of pure aluminium, will remove from that city to the new town of Kensington, on the Allegheny Valley Railroad, about 20 miles from Pittsburgh. The work of excavating for the foundation of the new plant has already been started, and will be pushed as rapidly as possible, as the firm have large orders on hand which must be filled at an early date. The new plant will have nearly three times the capacity of the one at present in operation and will employ at the start about 150 men, which number will be increased within the next six months. The plans call for five separate buildings, used for rolling mill, casting works, finishing department, machine shops and boiler house. It is the intention of the company to not only make the metal, but also to manufacture it into bars, wire, small billets and other shapes.

The Bostwick Metal Lath Company, recently organized and composed of capitalists of Youngstown, Ohio, have decided to erect their plant at Niles, Ohio. Work on it will be commenced at an early date.

A company has been organized at Seattle, Wash., with sufficient capital for the erection of large reduction works.

The Lehigh Car, Wheel and Axle Works, at Fullerton, Pa., are again in operation, with the exception of the axle department, recently burned. The contract for 1000 box cars will be pushed, and the new forge is almost ready for the slaters. As the machinery was not materially injured, the forges will soon again be in operation.

The Nickel-Steel Company have been organized and have made application to the Ontario Government for a charter. The company intend to erect smelting works at a point on the north shore of Lake Huron.

The Chester Mfg. Company, at Chester, Pa., have increased their capital stock from \$50,000 to \$100,000.

The Southern Queen Mfg. Company have been incorporated at East Chattanooga, Tenn., for the manufacture of nickel ornaments, castings for stoves, iron fencing, &c.

The Vulcan Road Machine Works of Kennett Square, Pa., are to remove to Charleston, W. Va., where the Land Improvement Company have offered them 4 acres of land, the erection of large building adjoining the railroad, and subscription to considerable stock in the company.

The annual meeting of the Fuel Gas and Mfg. Company of Pittsburgh was held in that city last week. George Westinghouse, Jr., was re-elected president, and George Westinghouse, Jr., John Caldwell, Lemuel Bannister, H. H. Westinghouse, Robert Pitcairn, A. L. McKaig and J. R. McGinley, directors.

It is reported that the Philadelphia Natural Gas Company of Pittsburgh earned \$265,000 during the month of April last.

The receivers of the Huntingdon Mfg. Company of Huntingdon, Pa., have filed their final account and have been discharged by the court. The works, which will now be operated by the Iron Car Equipment Company of New York, have large orders ahead.

The Iowa Iron Works of Dubuque, Iowa, builders of iron and steel boats, will remove to St. Louis, Mo.

Commodore N. H. Farquhar, Chief of the Bureau of Yards and Docks in the Navy Department, has returned from his visit of inspection to the Mare Island Navy Yard and the new dry dock site at Point Turner on Puget Sound. At the latter place he found that all the land needed for the station could be bought without condemnation, and the titles to the property are now being examined by the Attorney-General preparatory to concluding the purchase. As soon as the land is bought, proposals for the construction of the dock will be invited.

We are advised that a serious mistake was made in the announcement that Major Jed Hotchkiss of Staunton had died. It was his brother, Major N. H. Hotchkiss. Major Jed Hotchkiss is in good health, and is actively engaged in the development of the resources of the two Virginias.

The United States Supreme Court has upheld the constitutionality of the original package law.



# TRADE REPORT.

## Philadelphia.

Office of *The Iron Age*, 220 South Fourth St.,  
PHILADELPHIA, Pa., May 28, 1891.

**Pig Iron.**—The market has shown no change of feature of late, so that matters are pretty much in the same position as reported for several weeks past. The supply appears to be sufficient to meet the demand, but there is no surplus, so that any increase in consumption might easily stiffen prices. The collapse of the Coke strike, however, has had the effect of checking speculative movements, and for the time being there is a disposition to let things take their course, stocks being so light that there is no necessity to force sales, while, on the other hand, consumers see nothing to warrant them buying more than hand-to-mouth lots. The position is an eminently sound one, nevertheless, and while there is nothing to indicate higher prices in the near future, it is even more unlikely that there can be any decline. At the moment Southern and Western Irons appear to exercise a controlling influence. So far as regards local furnaces it would be entirely safe to talk higher prices, but—and there is the rub—prices are so evenly adjusted that 25¢ more for local Irons would be just sufficient to let in a flood of substitutes. Should there be an improvement at other points this market would quickly respond, but makers hereabouts are not inclined to do anything prematurely. The general position (taking the country as a whole) appears to be favorable, and if nothing unforeseen occurs there should be not only a much heavier demand, but somewhat better prices, the one being contingent upon the other. Sales during the week have been about of an average volume, and prices in most cases within the limits quoted herewith, slightly lower for deliveries at points a little West or South, but usually at full prices for seaboard delivery or its equivalent.

Ohio Softeners, No. 1x.....	\$19.00	@	\$19.50
Ohio Softeners, No. 2x.....	18.00	@	18.50
Standard Penna., No. 1x.....	17.50	@	18.00
Standard Penna., No. 2x.....	16.50	@	17.00
Medium Penna., No. 1x.....	17.25	@	17.50
Medium Penna., No. 2x.....	16.00	@	16.25
Virginia, No. 1x.....	16.75	@	17.50
Virginia, No. 2x.....	15.75	@	16.00
Standard Neutral All-Ord Forge	14.75	@	15.25
Ordinary Forge Cinder mixed ..	14.00	@	14.25
Hot Blast Charcoal.....	20.00	@	22.00
Cold Blast Charcoal.....	24.00	@	27.00

**Bessemer Pig.**—In the absence of sales prices are nominally about \$17 @ \$17.50, at furnace, for standard and \$19 @ \$19.50 for special brands, but there is nothing doing.

**Ferromanganese.**—Small lots are taken at about \$64 50, duty paid, for 80 %, but the usual asking price is \$65.

**Steel Billets.**—Asking prices are a trifle higher, but somehow or other consumers appear to get along without acceding to the demands made on them. No great amount of business has been reported recently, although it is supposed that several lots have been taken with the understanding that prices were not to be made public. Nominal quotations are \$27.50 @ \$28 for deliveries on the Susquehanna, or \$28 @ \$28.50 at seaboard or on the Schuylkill. Some, indeed, quote still higher figures, but consumers appear to get supplied from some source at lower rates than these. Nail Slabs are very quiet, however, many of the mills being shut down and others working only part time. Sheet and Plate mills are tolerably liberal buyers, but at best the demand is not important.

**Steel Rails.**—The market remains in much the same condition as reported for some months past, quiet, but at steady prices. Mills are moderately full for June

and July, but there is a singular apathy in regard to placing large orders, although there is not the slightest probability of lower prices, but rather the opposite in case there was any sudden increase in the demand. Meanwhile, sales are on the basis of \$30, f.o.b. cars at mills. P.S.—A sale of 6500 tons was closed to-day for a Southern Construction Company; prices said to be a trifle over \$30, f.o.b. cars Scranton.

**Muck Bars.**—Business is a trifle more active and prices are firm, especially for good qualities. Some lots recently placed at \$26.25 @ \$26.50, delivered, are proving to be of unsatisfactory quality, and the parties are now paying \$27 to have them replaced with something they can depend upon. There are cheap Bars in the market yet, but there is nothing at less than \$27, delivered, for a first-class article.

**Bar Iron.**—There is more business in sight to-day than for a long time past. Not enough to cause unusual activity, but enough to prevent the exceeding dullness which had become almost part and parcel of the trade. There is some inquiry for Bars for car building, and more yet from the same source is expected. The feeling is better already, and 1.70¢ Philadelphia, for good Bars is an inside figure for round lots, and from that up to 1.80¢ @ 1.85¢ for smaller lots. At points in the interior 1.65¢, f.o.b. cars, is usually quoted, and, although some get a little more, others are shading even that low figure on desirable specifications.

**Skelp Iron.**—Business does not improve to any extent, only small lots being called for at about 1.70¢ @ 1.75¢ for Grooved, or 1.85¢ @ 1.95¢ for Sheared.

**Plates.**—Mills are doing better in this department, the demand from several sources being quite active, compared with what it has been for some months past. Shipbuilders, bridge builders, tank builders, boiler makers and others have taken quite a liberal amount of material, and appear to be shaping for a still larger business in the near future. The consequence is that manufacturers are trying to get a little more money for their product, but as yet without very much success. Prices are irregular, especially in Steel, some quoting equal prices for Iron or Steel, others asking ½¢ more. General quotations about as follows, delivered:

	Iron.	Steel.
Tank Plates.....	2.00 @ 2.10¢	2.05 @ 2.20¢
Refined.....	2.20 @ 2.30¢	2.05 @ 2.10¢
Shell.....	2.30 @ 2.40¢	2.40 @ 2.50¢
Flange.....	3.20 @ 3.30¢	2.50 @ 2.75¢
Fire-Box.....	4.00 @ 4.25¢	3.00 @ 3.50¢

**Structural Material.**—The demand is somewhat better, and although no very large lots have been called for, so many small lots are wanted that mills are beginning to run full time in most of their departments. There is a vast amount of business in sight, but in the present unsettled condition of the money market it may be some time before it comes on the market. Meanwhile prices are about as follows (delivered): Angles, 2.05¢ @ 2.10¢; Sheared Plates, 2¢ @ 2.10¢, and 10¢ @ 15¢ more for Steel, according to requirements. Tees, 2.5¢ @ 2.6¢; Beams and Channels, 3.1¢ for either Iron or Steel.

**Sheet Iron.**—The demand is still slow and unsatisfactory, although mills are mostly running to full capacity in anticipation of the demand later on. Prices are irregular, but best makes are quoted about as follows:

Best Refined, Nos. 14 to 20.....	3.00¢ @ 3.10¢
Best Refined, Nos. 21 to 24.....	3.10¢ @ 3.20¢
Best Refined, Nos. 25 to 28.....	3.20¢ @ 3.30¢
Best Refined, No. 27.....	3.40¢ @ 3.50¢
Best Refined, No. 28.....	3.50¢ @ 3.60¢
Common, ½¢ less than the above.	
Best Soft Steel, Nos. 14 to 20.....	3¢ @ 3¼¢
Best Soft Steel, Nos. 21 to 24.....	3¼¢ @ 3½¢
Best Soft Steel, Nos. 25 to 28.....	4¢ @ 4¼¢

Best Soft Steel, Nos. 27 to 28.....4¢ @ ....  
Best Bloom Sheets, ¼¢ extra over the above prices.  
Best Bloom, Galvanized, discount.... @ 67¼ %  
Common, discount..... @ 70 %

**Old Rails.**—There is very little doing in either Iron or Steel, but prices are unchanged, and nominally from \$17.50 to \$18.50 for Steel, or \$22 to \$23 for Iron, price according to quantity, point of delivery, &c.

**Scrap Iron.**—Prices are not very strong, although for such lots as buyers happen to want the following prices are realized, viz.: No. 1 Railroad Scrap, \$21 @ \$21.50, Philadelphia, or for deliveries at mills in the interior \$21.50 @ \$22, according to distance and quality; \$15 @ \$16 for No. 2 Light; \$14 @ \$15 for best Machinery Scrap; \$13 @ \$14 for ordinary; \$15 @ \$16 for Wrought Turnings; \$10 @ \$10.50 for Cast Borings, and nominally \$24 @ \$25 for Old Fish Plates, and \$16 @ \$17, delivered, for Old Car Wheels.

**Wrought-Iron Pipe.**—The demand is improving, particularly for the smaller sizes, but discounts are irregular, and in some instances an extra five is allowed. Ordinary discounts are about as follows:

Butt-Welded Black.....	55 %
Butt-Welded Galvanized.....	45 %
Lap-Welded Black.....	65 %
Lap-Welded Galvanized.....	52½ %
Boiler Tubes, 2¼ inch and under.....	55 %
Boiler Tubes, 2½ inch and larger.....	60 %

The present partnership of firm J. W. Hoffman & Co. expires by limitation June 1. John W. Hoffman, senior partner, and the founder of the firm, and Ernest Law, the junior partner, will continue the business of the firm in all the departments of Iron and Steel. J. Ogden Hoffman retires to enter into partnership in the Carnegie associations of Pittsburgh, and will represent their various interests in this vicinity. The firm of J. W. Hoffman & Co. have been in existence for over 20 years, and for the last ten years have been prominent both in extent of business and enterprise in its development.

## Cincinnati.

(By Telegraph.)

Office of *The Iron Age*, Fourth and Main Sts.,  
CINCINNATI, May 27, 1891.

**Pig Iron.**—There appears to be little if any increase in the current consumption, the agricultural works being the only large consumers who have evidently increased their use of Iron, and have been in the market for considerable quantities; but supplies in the hands of other consumers had become so much reduced that they were ready to buy when prices appeared to be at the bottom. This week they have bought largely of Southern Gray Forge and the lower grades of Foundry Iron on the basis of \$10 at the furnace for the former and proportionate prices for the latter, the only observable change being that this price has been accepted not only for summer delivery, but for the autumn months. The latter has been conceded because of the settlement of the strike in the Connellsville Coke district, which it is thought will largely increase the output of Pig Iron, rendering it doubtful whether the advance hitherto asked of 25¢ @ ton for that delivery can be maintained. There is a prevailing sentiment that we will have good crops and that the general business of the country will in consequence become more prosperous, but the crops are not made yet, and their outcome will not be assured for some months, so that those who take a conservative view of the situation are not sanguine of an early increase in the consumption of Pig Iron, and, in any event, the product-

ive ability of the country is equal to any probable increase in consumption, and would doubtless be brought into operation to any required extent. But good crops do not show their full effect when assured; it takes considerable time for them to bring up the general business situation to one of assured prosperity, and it will be generally found that the year succeeding bountiful agricultural yields is the one which develops their full influence upon other branches of business. Perhaps this is why the railroads are in no hurry to put their rolling stock in order. Quotations are unchanged, as follows:

Foundry.		
Southern Coke, No. 1	\$15.00 @	\$15.25
Southern Coke, No. 2	14.00 @	14.25
Southern Coke, No. 3	13.25 @	13.50
Ohio Soft Stone Coal, No. 1	16.50 @	17.00
Ohio Soft Stone Coal, No. 2	15.50 @	15.50
Mahoning and Shenango Valley	17.50 @	18.00
Hanging Rock Charcoal, No. 1	20.00 @	22.00
Hanging Rock Charcoal, No. 2	19.00 @	20.00
Tennessee and Alabama Charcoal, No. 1	17.00 @	17.50
Tennessee and Alabama Charcoal, No. 2	16.50 @	17.10
Forge.		
Gray Forge	12.75 @	13.00
Mottled Neutral Coke	12.50 @	12.75
Car Wheel and Malleable Irons.		
Southern Car Wheel	19.50 @	20.75
Hanging Rock, Cold Blast	20.00 @	21.00
Lake Superior Car Wheel and Malleable	19.00 @	20.00

## Chicago.

(By Telegraph.)

Office of The Iron Age, 50 Dearborn street, CHICAGO, May 27, 1891.

Business is still improving in a general way, and the demand is strong in many lines for quick delivery, but railroad interests continue depressed, and there is as yet no indication when they will revive.

**Pig Iron.**—The heavy sales of Charcoal Iron made this month have not completely met consumers' requirements, as inquiries are still coming up for round lots. The leading furnace companies are now asking \$18, but there are a few sellers of less popular or new brands quoting \$17 @ \$17.50, who must be supplied with orders before the market can be claimed to have really advanced. The Car-Wheel manufacturers have not bought to any extent, so that there is an excellent outlook for further business. The Coke-Iron trade has been rather quiet recently, as compared with the first half of the month, but a great deal of business is in sight which is expected to develop shortly. Several furnaces in this vicinity will be blown in as quickly as they can be prepared for resumption of operations, now that the Coke strike is over, but some furnace owners are still inclined to defer blowing in until decisive action has been taken by the Mahoning Valley furnaces, as they think \$1.90, at the ovens, is too high a price for furnace Coke in the present condition of the Iron trade. Southern Coke has not been sold here to any extent the past week so far as can be ascertained, the local markets taking all the business now coming up. Small quantities of Bessemer have been sold at \$18. We quote for cash, f.o.b. Chicago:

Lake Superior Charcoal	\$17.00 @	\$18.00
Local Coke Foundry, No. 1	15.50 @	16.00
Local Coke Foundry, No. 2	15.00 @	15.50
Local Coke Foundry, No. 3	14.50 @	15.00
Local Scotch	16.00 @	16.50
Ohio Strong Softeners	18.00 @	18.50
Southern Coke, No. 1	16.00 @	16.50
Southern Coke, No. 2	15.50 @	15.75
Southern Coke, No. 3	14.75 @	15.00
Southern, No. 1, Soft	15.25 @	15.50
Southern, No. 2, Soft	14.25 @	14.50
Southern Gray Forge	14.25 @	14.50
Tennessee Charcoal, No. 1	18.00 @	
Alabama Car Wheel	22.50 @	23.50
Coke Bessemer	17.50 @	18.00
Hocking Valley, No. 1	17.00 @	18.50

**Bar Iron.**—Heavy business is reported by a number of sellers. One large implement works placed a season contract for about 5000 tons at slightly under ruling

rates. Other consumers and jobbers have purchased in quantities of 500 to 1000 tons. The market is firmer, and 1.67½¢, with half extras, is now the bottom rate for ordinary specifications. The local mills are well supplied with work by this time, and the situation is favorable for a further advance. Jobbers are anxious to mark up store prices, but cannot get all their number to agree to do so, hence they are still selling at 1.75¢ @ 1.80¢, full extras.

**Other Manufactured Iron.**—The demand for Structural shapes steadily grows heavier. More large building projects are developing which will consume a great deal of Steel in various forms. The Plate trade is irregular, some houses reporting an improving trade with numerous orders in sight, while others have found business dull. Tank Steel is lower from mill, owing to excessive competition for orders, but prices in other respects are unchanged. Good orders have been placed lately for Black Sheets, one order calling for 500 tons. The manufacturers now seem to be well supplied with work, as they are asking 2.85¢ @ 2.95¢, at mill, for No. 27. Galvanized Iron is in better demand from jobbers and tank makers, but the Cornice trade is rather quiet. Prices are unchanged.

**Merchant Steel.**—Implement manufacturers have placed some season contracts for Bar Steel, and general business has also been good, so that the week shows up well as compared with the recent past. Bessemer Bars are now selling at very low prices, but it is claimed by makers of standard grades that the low rates apply to Steel Bars rolled from old rails and not to those rolled from billets produced specially for Mild Steel Bars. Quotations as follows: Tool Steel, 6½¢ @ 8¢ and upward, according to brand and grade; Open-Hearth Machinery, 2.80¢ @ 2.50¢; Open-Hearth Spring, 2.50¢ @ 2.75¢; Tire, 2.30¢ @ 2.50¢; Bessemer Bars, 2¢ @ 2.15¢.

**Track Supplies.**—Steel Rails have been in moderate demand, but inquiries are increasing, and the prospects are growing brighter, pointing to a heavy trade in the course of a very few weeks. Manufacturers quote \$31 for round lots. Iron Splice Bars are quoted at 1.85¢ @ 1.90¢, Spikes at 2¢ @ 2.10¢ and Track Bolts with Hexagon Nuts at 2.80¢ @ 2.90¢, but these prices are nominal in the absence of business.

**Old Rails and Wheels.**—A sale of 1200 tons Old Iron Rails is reported, but the price is not named. A lot of 300 tons was sold at \$22.75. Old Steel Rails are dull at \$14.50 @ \$17, according to length. Old Car Wheels seem to be absolutely lifeless, with \$16.50 @ \$17 nominally quoted.

**Scrap.**—The market is again very quiet. A great deal of material is being offered, but consumers are not inclined to take hold of it. It is worthy of remark that while some classes of Scrap hold up remarkably well, Borings and Turnings are now cheaper than at any time since 1884. Dealers quote as follows per ton of 2000 pounds: No. 1 Railroad, \$19; No. 1 Forge, \$18.50; No. 1 Mill, \$13.50; Fish Plates, \$21 @ \$21.50; Axles, \$24; Pipes and Flues, \$12.50 @ \$13; Horseshoes, \$18.50; Cast Borings, \$7.50 @ \$8; Wrought Turnings, \$11.50; Axle Turnings, \$13; Machinery Cast, \$12; Stove Plates, \$8.50 @ \$9; Mixed Steel, \$11; Coil Steel, \$15; Leaf, \$16; Tires, \$18.

**Metals.**—Although bullish talk is quite prevalent in Copper circles, the price of Copper is quite weak. Lake is off to 13½¢, and casting brands 11½¢ @ 11¾¢, in carload lots. Spelter has been sold in large lots, and special prices were obtained for favorite brands, but other make can be

had in carload lots at 4.65¢ @ 4.75¢. Everett & Post state that there has been considerably more inquiry for Pig Lead in the several markets, and over 1000 tons have gone into the hands of consumers, spot and near future. They look for a large trade in the early fall, and unless there is a corresponding increase in the production higher prices will rule. Business at this center has been larger than for some time past, and considerable Lead has changed hands at 4.10¢, 4¼¢ and 4.15¢. At the close values are very firm and but little Lead is offering.

## Louisville.

LOUISVILLE, KY., May 25, 1891.

**Pig Iron.**—Buying continues fair, with some parties now showing a disposition to buy for long deliveries. There have been two or three instances where buyers have been in the market for deliveries to run 12 months, and in some cases to begin next fall and run throughout the coming season. The latter deliveries furnaces do not care to bid on, but it shows that some buyers feel that prices are satisfactory at the present moment, and that they are willing not only to purchase for this season's wants but for the coming. One of the largest companies have sold 10,000 to 15,000 tons on basis of \$10.25 for Gray Forge Birmingham, and are standing firmly at this price, which may be considered the price asked to day for Gray Forge by the leading companies, with very little disposition on the part of others to shade. During the first part of the week prices were not quite so strong, and one transaction of 1000 tons of No. 2 Soft, made in Chicago, was on the basis of \$10, Birmingham.

Among car companies orders are gradually coming in so that a number have what work they desire, but this is not the case with a few who are still seeking orders, but have hopes that they will shortly make contracts that will not necessitate their shutting down. One of the larger companies have just ordered a reduction in their freight-car department, but within a day or two after the order was given contracts were taken that will permit of their running full. We quote for cash, f.o.b. cars Louisville:

Southern Coke, No. 1 Foundry	\$14.50 @	\$15.00
Southern Coke, No. 2 Foundry	13.75 @	14.25
Southern Coke, No. 3 Foundry	13.25 @	13.75
Southern Coke, Gray Forge	12.75 @	13.25
Southern Charcoal, No. 1 Foundry	16.00 @	17.00
Southern Car-Wheel, standard brands	17.00 @	20.00

## Cleveland.

CLEVELAND, May 25, 1891.

**Iron Ore.**—There are few new features to report. In fact, when the strike of the Ore handlers and the inactivity of the furnaces are remembered, it is astonishing that there should be any buying at all. Prices are unchanged, and it is said that several fair blocks of Gogebic Bessemer have been let go during the past week at \$4.50. One or two mines in the Gogebic district are holding out for \$4.75, but it isn't exactly certain that this price will be obtained. Only 4000 tons of Ore went forward to the furnaces last week, against 34,000 tons for the same week last year. The Ore shovellers ask 3¢ more per ton than is paid at other lake ports. The Ore dealers compute that \$60,000 was paid out in this way last year, and offer 1¢ instead. No new Ore has thus far been unloaded here, and none seems likely to be for several days to come. Quotations are as follows:

No. 1 Specular and Magnetic Ores, Bessemer quality	\$5.25 @	\$5.50
No. 1 Specular and Magnetic Ores, non-Bessemer quality	4.25 @	4.50
Gogebic Ore, Bessemer quality	4.25 @	4.60
Menominee Ore, Bessemer quality	4.40 @	4.50
Menominee Ore, non-Bessemer quality	3.40 @	3.50



**Pig Iron.**—There have been no changes of importance in the Pig-Iron market. Prices are far from firm, and dealers everywhere sum up the situation in the epigrammatical observation: "Nothing new; absolutely nothing." Bessemer Iron is hardly holding its own, although little in the way of actual business is reported. A few small orders of Mill Iron have been bought to supply imperative needs. The prices paid were named by the purchasers and were not disputed.

**Old Rails.**—Two or three sales of Old Americans have occurred during the past week at \$23.50 @ \$23.75, but only a moderate amount of activity is discernible.

**Manufactured Iron.**—No very large sales are reported. The mills seem well occupied, and announce 1.60¢ @ 1.65¢ as the ruling prices for Common Bar.

**Scrap.**—Not much is being done and prices are somewhat uncertain. A sale of No. 1 Railroad Wrought is reported, the price paid being probably \$19.50. Cast Scrap is quoted at \$13.50, and Old Car Wheels at \$16.50 @ \$16.75.

**Nails.**—Business continues light and prices unchanged.

## Pittsburgh.

Office of The Iron Age, Hamilton Building,  
PITTSBURGH, May 27, 1891.

**Pig Iron.**—There has been an increased volume of business in Bessemer Iron the past week, but at a lower range of prices. Sales aggregating some 30,000 tons were reported at prices ranging from \$17 down to \$15.75, depending a good deal upon the delivery. Included in the sales was a lot of 3000 tons for June at \$15.75, and 8000 tons—1000 tons a month from and including May to December—on private terms; there were several sales for May and June at \$16 @ \$16.50, including 4500 tons at the last named figure. Forge Irons were in fair request during the week, with several good-sized sales reported at \$14 @ \$14.25 for well-known brands. Several lots of Southern Forge Iron were reported at \$13.75, cash—one lot of special bought for a special purpose \$14.50. There has been more activity in Foundry Irons, and as they are becoming a little scarce the market for desirable makes is a shade firmer. While the Coke strike is virtually over, a good many of the idle furnaces will not be started up until the Iron market improves; many furnacemen say what they now want is cheaper Coke, Ore and freight rates, and that they cannot start up their furnaces until their demands are complied with. This is the situation at the present time, and it must be confessed that it is not a very satisfactory one to the furnaceman, who does not like to have his furnace standing idle, but it is better to do so than to start up and increase the production, when it is difficult now to realize actual cost. We quote prices as follows:

Neutral Gray Forge.....	\$14.00 @ \$14.25, cash
All-Ore Mill.....	14.75 @ 15.25, "
White and Mottled.....	13.00 @ 13.50, "
No. 1 Foundry.....	16.50 @ 16.75, "
No. 2 Foundry.....	15.25 @ 15.50, "
No. 3 Foundry.....	14.25 @ 14.75, "
No. 2 Charcoal Foundry.....	21.50 @ 22.00, "
Cold-Blast Charcoal.....	25.00 @ 27.00, "
Bessemer Iron.....	15.75 @ 16.25, "

**Muck Bar.**—Continues rather quiet; not much offering and not much wanted. The few sales reported were at prices ranging from \$26.25 to \$26.50, cash.

**Ferromanganese.**—The demand continues of a hand-to-mouth character, while prices remain unchanged; we continue to quote 80 % domestic at \$66.50, cash, which has been the ruling price for several weeks past.

**Manufactured Iron.**—While we repeat former quotations, it is possible that for desirable orders they would be cut, as

manufacturers generally are anxious for business. Standard made city Iron, full extras, 1.70¢ for Bars; 2.10¢ @ 2.15¢ for Plate and Tank; No. 24 Sheet, 2.75¢ @ 2.80¢, all 60 days, 2 % off for cash; Skelp Iron remains as last quoted, 1.62½¢ @ 1.67½¢ for Grooved and 1.85¢ @ 1.90¢ for Sheared, four months, 2 % off for cash. Advices from the Shenango and Mahoning Valley districts report the mills out there as being pretty well filled up with orders, and that they are not cutting prices as closely as some weeks ago; quotations are still made at 1.55¢ @ 1.60¢ for Bars out there, half extras, according to character of order and delivery.

**Structural Material.**—While there is a fair business, it is not what it should be, which may be attributed mainly to the labor complications that have delayed a good deal of work. Prices continue weak, and we again make some reduction in our quotations: Channels and Beams, 3.10¢; Angles, 2¢; Sheared Bridge Plates, Steel, 2.10¢ @ 2.20; Universal Mill Plates, Iron, 2.10¢; Tees, 2.65¢; Refined Bars, 1.80¢ @ 1.90¢.

**Steel Plates.**—Continue dull; but little new business; some of the mills are busy working up old contracts.

**Nails.**—There is some inquiry reported for Cut Nails, but no improvement in prices. We continue to quote at \$1.55 @ \$1.60, f.o.b. at factory, for 30 to 35 average, 60 days, 2 % off for cash. The Wire Nail trade is also in bad condition. If reports are true, prices have ruled lower the past week than ever before in the history of the Wire Nail, sales having been made, it is reported, as low as \$1.90, delivered at Chicago. Some manufacturers are making no efforts to push business at present, and it may be that the market will steady up before long. The price quoted here is \$2, 60 days, 2 % off for cash.

**Wrought-Iron Pipe.**—Business is far from satisfactory, as in addition to a light demand it is claimed that the syndicate prices are not in all cases being adhered to. However, it is probable there will be an improved demand before long, for which there is plenty of room. The syndicate prices remain unchanged, as follows: Discounts on Black Butt Pipe, 55 %; on Galvanized do., 45 %; on Black Lap, 65 % on Galvanized do., 52½ %. Boiler Tubes, 2½-inch and smaller, 55 %; 2½-inch and larger, 60 %; Casing, all sizes, 55 %.

**Steel Billets.**—We continue to quote at \$25.50 @ \$26, cash, although the feeling is not as strong as it was a week ago, owing to the break in Bessemer Iron. However, the mills both here and at Wheeling are pretty well sold up and the market is holding better than it otherwise would. Some large contracts were placed both here and at Wheeling a few weeks ago, by reason of which manufacturers are in a position to hold off for a time if so disposed.

**Barb Wire.**—We continue to quote syndicate prices as follows: Glidden Painted, \$2.85; do. Galvanized, \$3.40; Four-Point Painted, \$2.80; do. Galvanized, \$3.30, in car lots, f.o.b. at factory. A broker here reports having placed nearly all his orders with jobbers ever since the syndicate was formed.

**Merchant Steel.**—Trade continues slow, but prices remain as last quoted: Bessemer Tool Steel, 7¢ @ 7½¢; do., Spring, 2½¢; do., Machinery, 2.40¢ @ 2.50¢; Toe Calk, 2½¢; Steel Tire, 2.20¢; Steel Bars, 1.90¢, full extras; Crucible Spring Steel, 4¢; Crucible Machinery, 5¢.

**Steel Rails.**—There appears to be an increasing demand, and heavy sections are quoted firm at \$30, f.o.b. at works here. It is reported that Carnegie, Phipps & Co. will start up the Allegheny Bessemer

mill shortly on Rails. It has been kept running on Billets ever since it passed into their possession. While not the largest, it is one of the most complete Rail mills in the country, having all the latest appliances and improvements.

**Railway Track Supplies.**—Spikes remain unchanged at \$2.05, f.o.b. at works here, 30 days. Splice Bars and Track Bolts are lower. We now quote the former, either Iron or Steel, at 1.80¢ @ 1.90¢, and Track Bolts at 2.75¢ with Square and 2.85¢ with Hexagon Nuts.

**Old Rails.**—There appears to be but little inquiry for Iron Rails, and in the absence of sales prices may be quoted nominally at \$23.50 @ \$24. There is some inquiry for Old Steel Rails, which may be quoted at \$17 @ \$18 for short and long lengths.

**Wire Rods.**—There have been no sales reported, in the absence of which prices may be quoted nominally at \$37 @ \$37.50, f.o.b. at mill.

**Old Material.**—There is no improvement in demand, and prices are weak. Small sales No. 1 Wrought Scrap at \$19 @ \$19.50 @ net ton; Iron Axles, \$26 @ \$26.50; Old Car Wheels, \$16.50 @ \$17, gross; Cast Scrap, \$14 @ \$14.50, gross; sale 1000 tons Steel Bloom Ends at \$18; Cast Borings, \$11.75 @ \$12.

**Connellsville Coke.**—While the strike is virtually over, business has not yet been fully resumed, and operators decline as yet to quote prices. A good many furnacemen, as stated elsewhere, will not start up their furnaces until they can get cost of production down, which means cheaper Coke, Ore, &c., or the price of Pig Iron up; this being the case, there is not likely to be much improvement in the demand for Coke soon.

## St. Louis.

Office of The Iron Age, 214 N. Sixth st.,  
St. Louis, May 25, 1891.

**Pig Iron.**—The past week has been a fairly active one, so far as the volume of trade is concerned. Several good-sized blocks of Iron have been taken on the basis of prices as quoted herewith. Gray Forge and No. 2 Foundry are particularly active, and a slight advance in price for these grades will no doubt shortly take place. Orders for future delivery are scarce, and consumers are buying only in such quantities as their present requirements demand, and do not seem to seriously consider the possibility of higher prices when they next enter the market. Whether their calculations in this direction will prove correct or otherwise is difficult to determine at this time. The present condition of prices is anything but satisfactory to furnacemen, who have been hoping for the past three months, and building their hopes on the Coke strike to a great extent, that prices would be materially higher at this time. Consumers, however, seem to have taken the opposite view and can be cajoled into buying only what their actual needs demand. The result is that prices are pretty much the same as when the Coke strike was inaugurated. During the week under review several thousand tons, consisting principally of No. 2 Foundry and Gray Forge, have changed hands at current rates. We quote as follows for cash, f.o.b. St. Louis.

Southern Coke, No. 1 Foundry.....	\$15.75 @ \$16.00
Southern Coke, No. 2 Foundry.....	14.75 @ 15.00
Southern Coke, No. 3 Foundry.....	14.00 @ 14.25
Gray Forge.....	13.50 @ 13.75
Southern Charcoal, No. 1 Foundry.....	17.50 @ 18.00
Southern Charcoal, No. 2 Foundry.....	17.00 @ 17.50
Missouri Charcoal, No. 1 Foundry.....	15.50 @ 16.00
Missouri Charcoal, No. 2 Foundry.....	15.00 @ 15.50
Ohio Softeners.....	18.75 @ 19.75

**Bar Iron.**—The demand continues to improve and mills are now comfortably employed. The railroads have not been large buyers of late, and from this source a large business is expected in the near future, as it is thought they cannot defer their purchases much longer. Prices are firm and show a tendency to advance. We quote as follows: Lots from store command 1.70¢ @ 1.75¢, delivered on cars at East St. Louis. Lots from store are quoted at 1.82½¢ @ 1.87½¢, according to quantity.

**Barb Wire.**—The outlook improves daily. Mills are kept busy filling orders at the recent advanced prices, and have cleaned their books pretty thoroughly of old-priced orders. There is less cutting reported, and from this it can be inferred that jobbers are now selling Wire bought at the advance, and are compelled to live up to prices to get out whole. The outlook is encouraging, and mills will have no difficulty to keep running full time for an indefinite period. Prices are firmly adhered to, as follows: Painted, 2.95¢; Galvanized, 3.50¢; carload lots, 10¢ per cwt. less than above prices.

**Wire Nails.**—There is a slight improvement noticeable in the demand, and prices are somewhat firmer than one week since. There is no doubt that Nails have been sold at a loss, and mills have determined to get at least dollar for dollar, which they have not done for some time past. The outlook in the building trade is very bright, and it is expected that a large business will be realized. We quote as follows: Carload lots from mill command \$2.10 @ \$2.15, f.o.b. cars St. Louis.

(By Telegraph.)

Inquiries for Pig Lead are more numerous, and buyers evince more interest in the market. Offerings are made in a limited way at \$4.15, at which price some sales have been made. Indications point to still further improvement. The offerings of Spelter are not as plentiful as one week since, and 4.60¢ is quoted for immediate shipment. A sale of 100 tons made to-day at 4.50¢. The outlook is considered fairly satisfactory to all concerned.

## Detroit.

WILLIAM F. JARVIS & Co., Detroit, Mich., under date May 25, say: Business during the past week has certainly been anything but dull, but we still have to report also anything but entirely satisfactory as far as figures are concerned. There was, to be sure, some strength shown in prices on Southern Foundry and Forge Irons, but no decided advance. One round lot of Southern Forge went at \$10, cash, at the furnace, while another brought a slightly higher figure, owing to extension in delivery. No transactions whatever can be noted on Northern Coke Irons, except a few cars of Blackband Ore Iron and Jackson County Silveries. We are officially informed to-day of the termination of the protracted Coke strike, and authorized to take orders for Foundry Coke at the figures ruling at the commencement of the strike. This will mean corresponding figures for Furnace Coke, and will, it is thought, keep the furnaces in the Mahoning and Shenango valleys still in idleness, and accordingly have little or no effect at present on the general market here. Lake Superior Charcoal has shown continued large transactions, chiefly in the Eastern and Central markets, and while helping to reduce the stocks on hand, will not in tonnage amount to as much as reported transactions of the week previous. Prices were low, but no lower than they have been and that bottom has

been reached and held will, we think, induce those who have not already covered for their season's wants to promptly do so, and the year 1891 will show that the business is chiefly done during the months of May and June, just as it was last year. The market generally may be said to look a trifle better. Quotations are as follows:

Lake Superior Charcoal, all numbers	\$18.00 @ \$18.50
Lake Superior Coke, Bessemer	18.00 @ 18.50
Ohio Blackband (40 per cent.)	18.00 @ 18.50
Lake Superior Coke Foundry, all ore	18.00 @ 18.50
Southern No. 1	16.25 @ 16.50
Southern Gray Forge	14.00 @ 15.50
Jackson County (Ohio) Silvery	18.25 @ 18.75

## New York.

Office of The Iron Age, 96-102 Reade street, New York, May 27, 1891.

**American Pig.**—The collapse of the Coke strike is not expected to have much effect on this market, because the blowing in of furnaces in the sections affected will influence the lower grades particularly, for which there is little sale in this market. While some cutting is reported by Northern makers, there is little doing in Southern Irons, the furnaces being all well sold up on Foundry grades. Northern brands are quoted \$16.75 @ \$18 for No. 1, \$16 @ \$16.50 for No. 2, and \$14 @ \$14.50 for Gray Forge. Southern Iron sells at \$16.50 @ \$17.25 for No. 1, \$15.50 @ \$16.25 for No. 2, \$16 @ \$16.50 for No. 1 Soft, and \$14 @ \$14.50 for Gray Forge. We note a sale of 2000 tons of Bessemer Pig at private terms. Ordinary Bessemer is quoted at \$16.75 @ \$17, at furnace.

**Spiegeleisen and Ferromanganese.**—In a jobbing way 20 % Spiegeleisen is selling at \$28 @ \$28.50, and Ferromanganese at \$63.50 @ \$64.50.

**Billets and Rods.**—Only a small business is being done at \$27.50 @ \$28.50, at sellers' mill, for Billets and \$38, at tide-water, for Wire Rods.

**Steel Rails.**—Business with the majority of mills is light, and authorities in the trade express the opinion that the year has so far advanced that there is little hope of its becoming very active for this year's delivery. The railroads apparently are poor. New enterprises have little chance of being floated, since the majority of bankers have their boxes full of bonds which they have been unable to market. In many cases bonds are now quoted below the prices at which they were taken by the bankers, who have floated only a small part of them. These accumulations of securities must first be absorbed by investors before bankers can be relied upon to take up and push new issues. So far as renewals are concerned the large lines have acted very conservatively. The result is likely to be that toward late summer and fall they will make a rush for material to put into track before the season for repair work is over. If the product is as large this year as it was in 1890, the mills, it is believed, will have done well. We note sales during the week of 10,000 tons, including one lot of 6000 tons to a Southern road, at full prices. We continue to quote \$30.75 @ \$31, at tidewater. In the April adjustment, two mills in Eastern Pennsylvania were the principal contributors to the amounts payable for excess over percentages of allotments.

**Rail Fastenings.**—We continue to quote Fish Plates 1.70¢ @ 1.75¢; Bolts, 2.60¢ @ 2.75¢, and Spikes \$1.90 @ \$1.95, delivered.

**Manufactured Iron and Steel.**—The mills are practically delivering nothing in this market, but are piling up the Structural Iron for the rush which will follow resumption of work. Still, the local strike is affecting the production adversely of

those works to which New York is the principal market. In about a month the large McComb's Dam bridge will be closed. We quote Angles, 1.95¢ @ 2.10¢; Sheared Plates, 1.95¢ @ 2.25¢; Tees, 2.45¢ @ 2.75¢, and Beams and Channels, 3.1¢, on dock. Steel Plates are 2¢ @ 2.15¢ for Tank, 2.3¢ @ 2.6¢ for Shell, and 2.5¢ @ 2.7¢ for Flange, on dock. Bars are 1.7¢ @ 1.9¢, on dock.

**Old Rails.**—The market is lifeless. Lately there have been some small sales of American Rails, which may be regarded as indicative of the position. A small lot was sold at Hartford, Conn., at \$20 on cars there. Another parcel was placed at a price equivalent to \$20.50 here. On the other hand, \$31.65 was declined by the holder at an interior point.

George A. Evans & Co. of 40 Wall street have severed their connection with the Bethlehem Iron Company, and will do a general business in Steel Rails, Track supplies and Old Material.

T. C. Mosedale, who has been connected with George W. Stetson & Co. for some years, leaves them on June 1 to take the sales agency of the Hudson Iron Company of Hudson, N. Y.

## New York Metal Exchange.

The following sales are reported:

THURSDAY, May 21.	
25,000 lb Lake Copper, October	13.00¢
16 tons Lead, June	4.35¢
25 tons Tin, July	20.35¢
FRIDAY, May 22.	
25 tons Tin, delivery the 10th	20.35¢
16 tons Lead, June	4.35¢
10 tons Tin, June	20.35¢
25 tons Tin, July	20.35¢
SATURDAY, May 23.	
25 tons Tin, buyer's option	20.35¢
MONDAY, May 25.	
25 tons Tin, August	20.30¢
TUESDAY, May 26.	
150 tons Tin, July	20.30¢

## Financial.

The gold export movement has continued to be the principal feature swaying operations at the Stock Exchange, but toward the end of the week the signs grew more numerous that the shipments of gold will soon cease. Up to this writing it seems probable that \$1,000,000 will be the largest amount which will probably go out on the steamers to day. It is reported that the Bank of England has reduced the premium it would allow on American gold a halfpenny, to 76/5½. A further reduction of a halfpenny in the premium of gold would bring the price down to what it was two months ago, and would put the rates for demand sterling up to \$4.89. The rate at which gold can be exported to London without loss is \$4.88½ for bars and \$4.89½ for coin, and the rate at which it can be imported without loss is \$4.83½. It is rumored that the London joint stock banks may co operate with the Bank of England in the undertaking to keep up the rates of money artificially in order to prevent the gold being drawn away from London back to the United States.

The latest crop reports are again favorable, and returns of earnings on the railroad show a satisfactory condition of affairs. One hundred and forty roads report March earnings of \$16,036,284 this year, as compared with \$15,929,322 last year. The statement of foreign trade of the United States for April shows exports of merchandise of \$70,931,549, against \$75,314,326 in March, while the imports of merchandise were \$81,269,686, against \$77,618,030 in March. For the 12 months ending April 30 there has been an excess of exports of \$34,405,194.



In spite of the heavy drain of gold from this financial center, money has continued easy during the week at 3 @ 4 %, which is due probably to the heavy currency movement from the West, clearly indicated by the fact that New York exchange at Chicago is 75¢ premium @ \$1000. The bank statement on Saturday showed a decrease of \$5,657,400 in loans, a decrease in specie of \$2,494,800, an increase of \$974,200 in legal tender, and a decrease of \$7,301,600 in net deposits. The banks held on Saturday \$5,217,650 above the legal requirements, thus showing an increase in reserve of \$304,800.

While posted rates have been advanced to \$4.85 @ \$4.89, the rates for actual business were as follows: Sixty days, \$4.84½ @ \$4.84½; demand, \$4.88 @ \$4.88½; cables, \$4.88½ @ \$4.89; and commercial bills, \$4.82½ @ \$4.83. The advance is due chiefly to the scarcity of bills and less inclination to draw.

## Metal Market.

**Pig Tin.**—Slightly lower prices from London seem to have had a rather depressing effect upon operations by local speculators, and, in the absence of conditions that would encourage outside speculative ventures, jobbers and consumers have purchased moderately. Aside from officially recorded transactions involving about 200 tons for July and August delivery, at 20.30¢, there is nothing more than a routine jobbing movement to note, and the indications are that no decided move is likely to take place until the extent of shipments from the Straits during the last half of the month is announced. The close of the week under review finds the market steady at about 20.30¢, net cash, for prompt and June delivery, with small lots out of store bringing about the usual premium.

**Copper.**—The market is still in uncertain form. The home demand for supplies for electrical and other purposes does not meet early expectations, while the output from the mines continues on a large scale, and an accumulation takes place that, for the time being at least, offsets all the advantage that might be derived from the late heavy sales of furnace material in Europe and the apparent strong position of the foreign market. Lake Superior Ingot is freely offered at 13¢, and sales, it is intimated, have been made under exceptional conditions at ¼¢ to ½¢ less. At this writing there is some demand at 12½¢, but no indication that consumers would take large quantities at that price. Arizona Ingot is quoted at 12½¢ and casting brands at 11¢ @ 11½¢, but those prices can be secured for small parcels only, although furnace material is represented as bringing relatively better rates in the foreign markets.

**Pig Lead.**—During the past week consumers have purchased about 1700 tons, chiefly for prompt and near future delivery, at about 4.35¢. This movement has served to stiffen the market considerably and offerings are reserved for the present, with 4.40¢ representing sellers' lowest estimate of value. The purchases alluded to have so far filled the pressing needs of consumers that there is just now some display of indifference on their part, although single carloads could be placed at 4.40¢, while there was some indication that 4½¢ would be paid for larger lots.

**Antimony.**—The demand has been unimportant, and prices are still more or less in buyers' favor. Hallett's quoted at 14½¢, LX at 15¢ and Cookson's at 15½¢ @ 16¢, in wholesale quantities.

**Spelter.**—There has been no important movement. Consumers are buying only as immediate wants dictate, and the offering is merely fair, with more or less show-

ing of firmness on the part of smelters. Prices remain practically as they were a week ago, with 4.85¢ @ 4.90¢ the strictly inside figures for prime Western brands, early delivery, and some little advance asked for future shipments.

**Tin Plate.**—The situation is practically the same as it was a week ago. Demand is slow and hesitant, arrivals continue heavy and prices are unsettled, with the advantage still more or less in buyers' favor, but no radical changes noted for the week under review, apart from sales of some descriptions of Roofing Plates at a sharp decline. Quotations for large lots on the spot are as follows: Coke Tins—Penlan grade, IC, 14 x 20, \$5.05; J. B. grade, do., \$5.25; Bessemer do., \$5.15; Siemens Steel, \$5.35. Stamping Plates—Bessemer Steel, Coke finish, IC basis, \$5.60; Siemens Steel, IC basis, \$5.75 @ \$5.85; IX basis, \$6.85. IC Charcoals—Melyn grade, \$6.12½; for each additional X add \$1.50; Allaway grade, \$5.75 @ \$5.80; Grange grade, \$5.90; for each additional X add \$1. Charcoal Terns—Worcester, 14 x 20, \$5.50; 20 x 28, \$10.50; M. F., 14 x 20, \$7.15; do., 20 x 28, \$14.75; Dean, 14 x 20, \$5.05; do., 20 x 28, \$10.10; D. R. D. grade, 14 x 20, \$4.85; do., 20 x 28, \$9.75; Mansel, 14 x 20, \$5; do., 20 x 28, \$9.85; Alyn, 14 x 20, \$5; do., 20 x 28, \$9.90; Dyffryn, 14 x 20, scarce; do., 20 x 28, \$10.50. Wasters—S. T. P. grade, 14 x 20, \$4.75; do., 20 x 28, \$9.30; Abercarne grade, 14 x 20, \$4.70; do., 20 x 28, \$9.25.

## British Iron and Metal Markets.

[Special Cable Dispatch to The Iron Age.]

LONDON, WEDNESDAY, May 27, 1891.

Operations in Pig Iron warrants, while not on as large a scale as during the preceding week, have been quite liberal, and prices have fluctuated widely. Some good sized parcels changed hands, chiefly in settlement of "bear" accounts, which are now believed to be reduced to moderate proportions. Some operators, however, have made fresh purchases on the strength of reported improvement in the demand for Iron for consumption. Latest transactions in warrants were at 54/ @ 54/3 for Scotch, 41/7½ for Cleveland and 53/ @ 53/6 for Hematite. The stocks of warrants in Connall's stores have increased and now amount to 537,000 tons Scotch and 121,000 tons Cleveland.

The Pig Tin market has been quieter and prices have fallen somewhat from the highest point in the absence of support from the "bull" interest. Outside speculation is very light at the present time.

Active speculative buying caused a further rise in prices of Copper early in the week, and while business has been on a smaller scale the past few days there is yet a good consumptive demand that sustains the market.

There has been more inquiry for Tin Plate since the holidays, prompt shipments being in particular demand. Prices have not been affected, however, as there is still a liberal supply to draw upon while sellers are willing to let go at late current prices.

The Steel trade, as a whole, is quiet and prices are irregular. Ship Plates are now offered at £6, without leading to larger purchases.

Bolckow, Vaughan & Co. have issued a notice to Steel makers that their contracts will be terminated in a fortnight, owing to low prices current. Over 3000 men are concerned.

Three Glasgow Metal firms have failed, including Robb, with liabilities of £30,000; Pyle, £4,000, and Wylie Brown about the same.

Supplies of Old Iron are reported as being light in this market.

**Scotch Pig Iron.**—Sales have been merely fair and prices show little change:

No. 1 Coltness, f.o.b. Glasgow	63/
No. 1 Summerlee, " "	60/6
No. 1 Gartsherrie, " "	60/
No. 1 Langloan, " "	62/6
No. 1 Carnbroe, " "	55/6
No. 1 Shotts, " at Leith	62/
No. 1 Glengarnock, " Ardrossan	60/
No. 1 Dalmeilington, " "	53/6
No. 1 Eglinton, " "	51/6
Steamer freights, Glasgow to New York, 2/;	
Liverpool to New York, 10/.	

**Cleveland Pig.**—The market is unsettled and prices are irregular; makers quote 41/ for No. 3 Middlesborough, f.o.b.

**Bessemer Pig.**—Business is moderate and makers' prices are lower than warrants, with 52/ quoted for West Coast brands, Nos. 1, 2 and 3, f.o.b. shipping port.

**Spiegeleisen.**—The demand is moderate, but with light offering prices are steady. English 20 % quoted at 95/ @ 97/6, f.o.b. shipping port.

**Steel Rails.**—There is a fair business passing and prices are steady. Heavy sections quoted £4. 10/ @ £4. 12/6, and light sections £5 @ £6, f.o.b. at N. W. England shipping point.

**Steel Blooms.**—The market remains very quiet, with prices standing as heretofore. Makers ask £4. 5/ for 7 x 7, f.o.b. at N. W. England shipping point.

**Steel Billets.**—Only a moderate business passing, and that at former prices. Bessemer, 2½ x 2½ inches, quoted at £4. 10/, f.o.b. at N. W. England shipping point.

**Steel Slabs.**—A quiet market, and no change in sellers' prices. Bessemer quoted at £4. 10/, f.o.b. at N. W. England shipping point.

**Old Iron Rails.**—The offering is light, and the demand shows no improvement. Tees quoted at £2. 17/6 @ £3 and Double Heads £3 @ £3. 2/6, f.o.b.

**Scrap Iron.**—Supplies are moderate and prices firm, but the demand continues slow. Heavy Wrought quoted at £2. 10/, f.o.b.

**Crop Ends.**—The market remains very quiet and without change. Bessemer quoted at £2. 15/ @ £2. 17/6, f.o.b.

**Tin Plate.**—No change apparent in the market to-day. Business is moderate and prices are barely steady. We quote, f.o.b. Liverpool:

IC Charcoal, Alloway grade	18/ @ 18/3
IC Bessemer Steel, Coke finish	16/ @ 16/3
IC Siemens	16/3 @ 16/6
IC Coke, B. V. grade	16/ @ 16/
Charcoal Terns, Dean grade	16/ @ 16/

**Manufactured Iron.**—Trade slow in this line and prices still rather weak. We quote, f.o.b. Liverpool:

Staff, Marked Bars	£ s. d.	£ s. d.
Common	8 10 0	8 7 6
Staff, Bl'k Sheet, singles	6 15 0	6 15 0
Welsh Bars (f.o.b. Wales)	5 12 6	5 15 0

**Tin.**—The market, though somewhat irregular and quiet, showed firm undertone at the close. Straits quoted at £92. 7/6, spot, and £91. 17/6 for three months' futures.

**Copper.**—Futures traded in quite extensively to-day and spots also moderately active at full prices. Merchant Bars quoted at £53. 17/6, spot, and £54 10/3. three months' futures. Best Selected, £57. 10/3.

**Lead.**—Demand has been fair and the market is steady at £12. 7/6 for Soft Spanish.

### Phenomenal Friction.

In the Journal of the Franklin Institute we find an article headed as above by John H. Cooper. Last February while making experiments with the Thurston railroad testing machine he noticed the ease with which the axle box could be made to slide longitudinally upon the axle when the same was in motion. The several boxes tried had about 14 square inches of surface in contact with the axle; they were variously loaded with weight from 262 pounds upward, and the axle was running at speeds varying from 160 to 400 revolutions per minute. One box could be moved by a pressure of 1 ounce when the axle was running, but required 32 pounds to move it when the axle was still. Another box was moved by 4 ounces with motion, but required 40 pounds without motion of the axle. A third box under considerable pressure could be moved readily by a pull of 6 ounces, but 50 pounds would not start it when the axle was still, and, indeed, on trial all the muscular force that could be applied to it by the hands, with the foot against the machine, failed to start it.

A spring balance was used in these experiments for pulling the box in a line parallel to the axle. Forces anywhere from 160 to 1, up to perhaps 1000 to 1, are employed for moving the same body, under the same load and conditions, except that of the revolving or standing shaft beneath it. This phenomenon of friction proved a marvel to all who witnessed it. The temptation was great to theorize upon the extraordinary performance, but no theory was offered in explanation of it. A practical suggestion was made, however, in reference to planer-bed motions, and the like, which drag so heavily upon their fixed ways. If, as then proposed, revolving shafts were placed in the bed ways, and the table fitted to them, a pound pressure would move the table and its load back and forth on the revolving ways, where 1000 pounds or more would be required to do this work upon the usual fixed V's of planers as they are generally built. Numerous applications of this principle will readily suggest themselves to the ingenious reader when considering the necessity and the difficulties of moving dead loads, especially where ease and celerity of the movement may be required. To the writer, this unique action, as if the loaded box were floating, was an instructive object lesson in mechanics.

### "Phenomenal Friction" Explained.

The above brought forth a communication from Coleman Sellers addressed to the *Railroad Gazette*. He states that this has been known for years and has been used in a legitimate manner, but not as proposed by Mr. Cooper.

In the case of a sliding spindle lathe the phenomenon mentioned by Mr. Cooper is shown and is familiar to all workmen. This seeming diminution of frictional resistance to end sliding motion, while in the act of revolving, is taken advantage of by makers of testing machines to overcome the frictional resistance of the leather packing on the hydraulic rams. Unwin in "Testing of Materials of Construction,"

in his description of a testing machine, on page 234, says: "To eliminate the friction of the small indicator piston, it is kept in rotation by the pulleys shown at the end of the recording apparatus. The friction at a high speed is small, and practically the friction of the cup leather of the small piston seems to be neutralized by this rotation."

It would be hardly worth while to mention this instance of the advantage to be derived by the knowledge of the principle involved, if I did not call the attention of those not familiar with the subject to a consideration of what is taking place when power is applied to slide the spindle in its bearing while at rest and when revolving. A spindle nearly 4 inches in diameter is 13 inches in circumference, and for the sake of argument may be considered as moving at the rate of 400 feet when revolving at that speed per minute. Each point on the spindle moves a distance of 400 feet each minute through a path that is circular, but if laid out on a plane would represent a right line 400 feet long. The driving power in overcoming frictional resistance of the spindle and in the experiments cited has not been given, and if we now try to slide the spindle endwise a distance of 1 foot in one minute, it would be as if, with a forward motion of 400 feet on a plane, we caused another force acting at right angles to the driving force to make the moving point pass over the diagonal of a rectangle, one side of which is 400 feet and the other 1 foot. According to the well-known "resolution of forces" the diagonal of this rectangle will be to the length of the long side of the rectangle as  $\sqrt{160,000}$  is to  $\sqrt{160,001}$ , or as 400 is to 400.00124.

Knowing the power required to cause rotation under any given pressure, one can graphically determine just what power will be required to cause end motion at any given speed with absolute certainty as to the result. Each moving point of surface at high speed can be deflected from its line of motion by a force very much less than that required to give the primary motion, just as the water of the river deflects the cannon ball that strikes its surface at an acute angle and causes it to skip over the water in successive leaps, to plunge with little loss of force into the target. The cannon ball in passing from the gun would travel in a right line but for the force of gravity, that is constant, while the propelling force that started the ball is lessened by the friction of the air. Let a ball fall from a high tower, it will fall toward the exact center of gravity of the earth below it if no other force is acting at a right angle to the force of gravity. A breath of wind that would not disturb a ball resting on a solid plane will cause the following ball to miss the spot that is "plum" below the starting point of the fall.

This phenomenal (?) friction can be classed with the deviation of the falling ball or with the possible deflection of a rifle ball by the smooth surface of a leaf that it happens to strike in its flight. The power expended in rotating the plunger to diminish the frictional resistance of the packing does not lessen the total friction of the machine, but increases it, taking it from one place and adding it to another. The hasty publication as new of phenomena that have been well known for years, and through wrong perception of cause, the suggestion of uses that are not useful, is an error, in this instance intensified by the recommendation that the frictional resistance of planing machines would be diminished by replacing flat or plane V sliding surfaces or "ways" by revolving cylindrical guide bars.

A planing machine fitted with revolving guides in place of plane guides will take

less cut if the machinery to rotate the guides be driven by the same belt that gives motion to the table. Every new motion added and every new moving part will add to the total frictional resistance of the machine. Hence, the fewer the moving parts the better. The power required to rotate the guide bars is the same as, if not greater than, that required to move the table on flat guides. We try to force a cork into the neck of a bottle by a straight push, and we exhaust our strength more and do less than if we give a twist to the cork in pushing, and so add the force of other muscles to those required to push it without rotation. Presenting as phenomenal what is really not so is apt to lead those who cannot view things evenly to wrong conclusions.

### The Washburn & Moen Company Elect New Officers.

The annual meeting of the Washburn & Moen Mfg. Company was held at the works on Grove street, Worcester, Mass., May 26. There were about 12,000 of the 15,000 shares of capital stock represented. The only surprise of the meeting was the resignation of Charles G. Washburn, the assistant secretary and counsel, who, it is understood, will in the future devote his time to his other business interests. A complimentary resolution to Mr. Washburn, recognizing his services, was passed.

The result of the stockholders' meeting was the choice of the following corporation officers: C. F. Washburn, P. W. Moen, G. T. Dewey, W. E. Rice and Stephen Salisbury, directors, and P. W. Moen, treasurer; Charles F. Washburn, secretary, and P. W. Moen, clerk. The directors later organized by choosing William E. Rice president, Charles F. Washburn vice-president, and George T. Dewey clerk. They appointed P. W. Moen general manager and F. H. Daniels general superintendent. It will be noticed that the new members of the Board of Directors are William E. Rice, who also succeeds the late Philip L. Moen as president, and Stephen Salisbury. The late Mr. Moen was also treasurer, and that office is now filled by his son.

William E. Rice was inducted into the business of manufacturing wire nearly 40 years ago, when in 1852 he entered the counting room of Ichabod Washburn & Co., on Grove street, as clerk, where he was employed until 1859, at which time he engaged in the same business under the style of William E. Rice & Co., this firm carrying on a successful business at Holyoke until 1865, when it was merged with the I. Washburn & Moen Wire Works, in which corporation Mr. Rice became an officer. He was active in organizing the Quinsigamond Iron and Wire Works in 1865, and was their treasurer until, in 1868, this corporation and the Washburn & Moen Wire Works were consolidated under the corporate title of Washburn & Moen Mfg. Company. He was an incorporator of this company and their treasurer from their incorporation until 1875. The Worcester Wire Company, of which he is president, were organized by him in 1877. He is a director of the City National Bank, having had a chair there since 1873. It is understood that Mr. Rice intends to take an active part in the business of the Washburn & Moen Company.

Philip W. Moen, the son of the late president of the company, is only 34 years of age. During the last few years of his father's life he was general superintendent, and the elder man depended to a great extent upon the younger. Mr. Moen is a graduate of Yale University, but has been in the works since 1881. He studied at the Royal School of Mines in Stockholm, paying particular attention to iron.



# HARDWARE.

## Condition of Trade.

**T**HE VOLUME of general business continues fair, though not heavy, and some disappointment is expressed as to the course of trade during the present month, which is referred to as not having shown that increase in the latter part which was hoped for at its commencement. There is, however, a steady business doing, but the trade are not purchasing with much freedom or snap, limiting their orders, apparently, to their early requirements and giving the impression that they are restrained from buying more freely by sluggishness in collections, the dullness of their trade or a lack of confidence in the strength of existing prices. Our advices indicate, however, that the aggregate of business is fairly large and that many manufacturers have no reason to complain, comparing this season's trade with that of other years. In the matter of prices the market remains steady, few quotable changes being announced. In some lines, such as Lawn Mowers, Barb Wire, Green Wire Cloth and other seasonable goods, there is something of a scarcity, the trade experiencing some difficulty in having their orders filled with the usual promptness.

The following advices from Huntington-Hopkins Company, San Francisco, Cal., were received too late for use in our last issue. Referring as they do to the condition of things on the Pacific Coast they will be of interest:

Briefly summing up the Hardware situation in this market, we have to advise that the outlook at present is good.

The prospects for a large grain and fruit crop are encouraging, and in view of these facts, country merchants are ordering with a little more freedom, although not as freely as we could wish.

Prices still remain about the same. Money is scarce throughout the State, and from appearances we judge it is likely to be so until after the harvest.

### St. Louis.

(By Telegraph.)

Reports from the country indicate a continued activity in Hardware. Orders received are generally accompanied with the request that they be shipped immediately, indicating that stocks on hand are light. The usual demand for seasonable goods is noted, and Building Tools and Implements are selling freely. Wire Nails have evidently reached bottom, and those who have not already bought will more than likely be compelled to pay higher prices when they enter the market.

They are firm at \$2.25 to \$2.30 for large quantities. Stove Boards are weak. Barb Wire is active at unchanged prices. Tin Plates continue weak, and Cut Nails fail to show any improvement. Jobbers of Saddlery Hardware are kept very busy. Collections are only fair.

### Chicago.

(By Telegraph.)

The general Hardware trade has increased considerably in volume since the first of the month and has also widened in its scope. Builders' Hardware and seasonable goods are in active demand and even staple goods are being more freely called for. The Tinware trade is, however, only fair and not coming up to expectations. Tin Plates are still weak and prices are cut, especially on Coke and Roofing Plates, but regular quotations remain the same. The jobbers of Heavy Hardware report a continued heavy demand from consumers of their goods, particularly wagon builders.

## Notes on Prices.

**Wire Nails.**—Since our last report there has been little change either in the tone of the market or the volume of business. Some large sales are reported at figures which are a slight concession from the prices which have generally been supposed to be bottom. For carload lots \$3 may be named as the general price at mill, but this figure is frequently shaded 5 cents, with exceptional concessions in special cases. Small lots from store are held at \$2.25 to \$2.30.

*Chicago, by Telegraph.*—Manufacturers report continued depression in prices and buyers taking hold very cautiously for fear that they may not get bottom rates. The market in the Northwest has been demoralized by offers of special lots of Wire Nails at specially low prices, which would not be named on regular sizes, and it will take some little time to recover from this condition. Jobbers quote \$2 20 from stock for small lots, with the usual reductions for carloads, but this price is being shaded in some cases.

**Cut Nails.**—During the month a good many Cut Nails have been purchased and there is at present a fair activity. Prices, however, show no improvement and \$1.55 at mill is a fair quotation, but this figure is shaded on desirable orders. Carload lots at dock, New York, are quoted at \$1.65 to \$1.70, and small lots from store at \$1.75 to \$1.80.

*Chicago, by Telegraph.*—Inquiries for factory lots of Steel Cut Nails have been somewhat better of late, but prices show no improvement. At the same time this branch does not show the weakness seen in Wire Nails, which is due to the fact that so many Cut-Nail manufacturers have dropped out of the ranks. The usual price for an ordinary average from factory is about \$1.70, Chicago. Jobbers quote \$1.80 for small lots from stock.

**Barb Wire.**—The principal feature of the Barb-Wire market is the difficulty in obtaining the Wire as fast as required. Most of the mills are full of orders. Prices remain without change on the basis of \$3.50 for Four-Point Galvanized and \$2.95 for Painted, with the regular abatement of 10 cents for carload lots and 5 cents for jobbers and railroads; terms 60 days, or 2 per cent. discount for cash in ten days, with delivery at leading points.

*Chicago, by Telegraph.*—A better demand has latterly sprung up, and the jobbing houses now report a fair trade in progress. Manufacturers are holding prices steadily, as agreed upon, but an occasional cut is made by jobbers, which, however, does not seem to affect the manufacturers. The bottom price on painted here is \$2.80, with no distinction at present between carload lots and smaller quantities.

**Glass.**—Local demand is restricted by labor troubles, notably the lumber lock out and the housesmiths' strike, both of which interfere with the carrying on and completion of large building projects. Advices from Pittsburgh and the West indicate an improvement in the Glass situation. Leading Glass manufacturers are said to report a scarcity of Glass. At the meeting held by the Glass manufacturers in Chicago May 20, existing prices were reaffirmed. Regarding the reported strikes among the French Glass operators, to which reference was made in our report of last week, the facts are these: There were 36,000 coal operators on a strike in France out of the 75,000 men engaged in the coal mines. Dockers also refused to unload coal shipped from England. This may affect the Glass interests by causing a scarcity in fuel, but those who are engaged in the French Glass business, both abroad and in New York, are of the opinion that the trouble will be but temporary, and will consequently not affect the price of imported Glass. For the benefit of our readers we will state that on Plate Glass under 10 square feet to the light a better discount is allowed than on sizes over 10 square feet to the light. The difference in discount, however, is small. The price also depends somewhat upon the quantity ordered. Prices on Glass remain unchanged, on the basis of: American Window Glass, for carloads, 80 and 10 per cent. discount; less than car lots, 80 and 5 per cent. discount; French Window Glass, 75 and 10 per cent. discount, with an additional 5 per cent. discount when 50 boxes are ordered and taken in any calendar month. American Plate is held at discount 50, 10 and 5 per cent., and Imported Plate at discount 60 per cent.

**Tacks.**—The Tack market remains without improvement. Prices are uneven, there being no uniformity in either the base discounts or the net prices of the different manufacturers on the same goods, so that careful buyers find it necessary to

compare quotations closely. The formation of the Atlas Tack Corporation has not as yet had any effect on the market, prices continuing on substantially the same basis as before.

**Lawn Mowers.**—The demand for Lawn Mowers has this season been exceptionally large and nearly all the manufacturers report a satisfactory trade. The prices of the leading Mowers which are held at the highest figures have been very well maintained by the manufacturers, but have been in a number of instances cut by the jobbers, who are quoting lower prices to the smaller trade than could be obtained from the manufacturers. New and miscellaneous Mowers which have not a recognized position in the market are, however, selling at low and irregular prices, a discount of 70 and 10 or 75 per cent. being frequently made.

**Wheels.**—The Wheel market remains in a somewhat uncertain and critical condition. The impression prevails that the American Wheel Company have been making prices on some goods considerably lower than those announced by them, and it remains to be seen whether they will be able to carry out their plans in view of the active and enterprising opposition of some of the large vehicle makers. The organization of the Mutual Wheel Company, which we announced in our last issue, is regarded as significant and promising before long to be an important factor in the market. The American Wheel Company are, however, evidently prepared to take whatever action may be deemed best for the furtherance of their interests and the carrying out of their plans. The general impression, however, prevails that the recent exorbitant advance in prices was unwise and tends to encourage formidable competition.

**Wringers.**—The Wringer market remains in the same condition as for some time past. Prices continue firm, with the prospect of an even and satisfactory market, owing to the consolidation of the principal companies and the reports of further concerted action on the part of leading makers not in the consolidation.

**Lanterns.**—The following are the prices on leading styles of Tubular and Police Lanterns manufactured by R. E. Dietz Company, 60 Laight street, New York:

*Tubular No. 0, Standard Size.*

	Per doz. net. With guard.
Regular Tubular.....	\$4.00
O. K. Tubular.....	4.25
Lever Tubular.....	4.50
Square Lift Tubular.....	4.50
Best Square Lift Tubular.....	5.50
Best Round Lift Tubular.....	6.00
Iron Clad Lift Tubular.....	6.50
With Bull's-eye Globes, additional.....	.50
Packed in cases of one dozen each, without charge.	

*Police Lanterns—2½ and 3-inch Regular and Patent Flash Light.*

	Per doz. net.
2½-inch Bull's-eye Police Lantern.....	\$3.00
3-inch Bull's-eye Police Lantern.....	3.90
2½-inch Flash Light Police Lantern.....	4.00
3-inch Flash Light Police Lantern.....	4.50
Packed in cases of two dozen each.	

**Shot.**—It is thought not unlikely that reduced prices on Shot will be announced before long unless there is some advance in the price of the raw material.

**Wire.**—The Wire market, while not materially changed since our last reference to it, is characterized by a somewhat weak tone, and is apparently in the buyers' favor. Some large sales have recently been made at concessions from prices which have heretofore been maintained, and there are rumors of some transactions at exceptionally low figures.

**Oil Stone.**—The Deerlick Stone, put on the market by the Deerlick Oil Stone Company, Chagrin Falls, Ohio, is quoted as follows:

Deerlick Stone, extra, warranted, per pound.....	\$0.18 to \$0.20
Deerlick X Stone, per pound.....	.16 to .18
Deerlick Slips.....	.32 to .35

The company advise us that their Stone, although comparatively new on the market, is having an increasing sale and meeting with favor. A good many dealers are reported to be handling it exclusively, as the Stone is guaranteed. It is referred to as equally good whether used with oil or water.

**Crayons.**—The following is the form in which American News Company quote Chalk Crayons and Assorted Colored Crayons. They state that the prices

*Chalk Crayons.*

Manufacturers' and dealers' minimum selling prices.	50 cases and over, per case.	15 to 49 cases, per case.	10 to 24 cases, per case.	5 to 9 cases, per case.	1 to 4 cases, per case.	Less than 50 gross, per gross.
White, round.....	\$7.25	\$7.37	\$7.50	\$7.75	\$8.00	\$0.10
Yellow Enameled, round.....	8.35	8.50	8.65	8.85	9.50	.12
Pink " ".....	8.90	9.05	9.20	9.50	10.10	.13
Purple " ".....	8.90	9.05	9.20	9.50	10.10	.13

*Assorted Colored Crayons.*

Manufacturers' and dealers' minimum selling prices.	100 gross and over.		50 to 99 gross.		25 to 49 gross.		Less than 25 gross.	
Assortment of colors in each gross box.	No. 1.	No. 2.	No. 1.	No. 2.	No. 1.	No. 2.	No. 1.	No. 2.
Prices per gross.	\$0.61	\$0.50	\$0.67	\$0.56	\$0.75	\$0.65	\$0.90	\$0.80

quoted are those which the manufacturers require them to charge for the goods, which can be shipped either from Waltham, Mass., or Sandusky, Ohio, f.o.b. cars. Unless otherwise ordered they will ship from New York with an additional charge of 50 cents for each case. A case of crayons, either white or colored, contains 100 gross.

### Trade Items.

**ENTERPRISE MFG. COMPANY,** Philadelphia, Pa., advise us that they are now tinning Cast Iron, a process which has been difficult heretofore, and upon which they have spent much time, labor and money. Goods which were formerly japanned or painted in various ways by them are now successfully tinned. It is claimed that tinning has many advantages over coatings of japanning, galvanizing, &c. It is stated that the tinning is brighter, harder, cleaner, and nicer looking; and that as it is a well known fact that Tin withstands the oxidizing of the air, whether dry or moist, at ordinary temperature, it is seen that tinning will protect the article from rust.

**PALERMO MICA COMPANY,** 27 Peck Slip, New York, call the attention of the trade in a circular to their ability to fill

orders promptly for any size, shape or quantity of Mica on most favorable terms. They emphasize the fact that they fill all of their orders with the same uniform quality of Mica.

THE ESTABLISHMENT of the George F. Drew Hardware Company, Jacksonville, Fla., was destroyed by fire on May 18. Their loss is estimated at \$25,000, which it is thought is fully covered by insurance.

ON THE MONTHLY CALENDAR sheet for June, as sent by Pratt & Latchworth, Buffalo, N. Y., a representation of the Buffalo Scotch Hames is shown.

OUR READERS will observe the advertisement on another page of M. V. Livingston Mfg. Co., 245 Columbus Avenue, Boston, in which they illustrate their machine and announce that they are again in the market. This Bicycle, our readers will remember, is chainless and its noiselessness is specially referred to by the manufacturers. The company advise us that the reputation achieved by them in the past as makers of Cycles of excellent material, workmanship and finish will be maintained, and they desire that Hardware dealers especially who would like an agency for an attractive and profitable Bicycle should send for their catalogue and terms.

THE AMERICAN SCREW COMPANY, Providence, R. I., have purchased property at Leeds, England, where they are arranging

to establish a plant for the manufacture of Screws for foreign markets, equipping it with machinery from their New England mill. This machinery is for cutting Screws, and has not been operated to any great extent. They expect to employ their new swaging machinery, similar to that with which they are now equipping their New England mill. The project of establishing a plant in Germany is also under consideration.

W. B. BELKNAP & Co. of Louisville, Ky., were recently visited by one of our representatives, who found the firm still in their old quarters, but with so many improvements made since his previous call that they were hardly recognizable. The front of the storeroom on the ground floor has had a large space partitioned off in the center, which is used as a general office and salesroom. The partitions are of glass, with as little wood-work as possible, so that the offices are very light, despite their location. This improvement is the work of one of the most famous office-fitting establishments in the Northwest, and has been most handsomely executed. The counting room is in the extreme rear of the same floor, removed from the bustle of the general business. Additional warehouse room has been secured by the firm in adjoining buildings to accommodate their increased business. They are now at work on a new catalogue, which they hope



to be able to issue in the fall. Advance sheets indicate that the publication will be in the highest style of the printer's art.

RIDGWAY REFRIGERATOR MFG. COMPANY, Philadelphia, in their advertisement on another page refer to 1000 Refrigerators which they offer below cost of manufacture. The company advise us that this offer is made to reduce their stock, which is somewhat larger than they desire.

MANY OF THE PROMINENT Hardware dealers of Boston, believing it to be of advantage to shorten the hours of labor for employees through the summer, have agreed to close their stores at 2 o'clock Saturday afternoons, beginning with June 6 and continuing through the months of June, July and August.

MARSHALLTON IRON WORKS, Marshallton, Del., have appointed Ross & Fuller Association, 33 Chambers street, New York, agents for the sale of their Star Elbows in the State of Pennsylvania (excepting Philadelphia), New York State and New England.

THE RIVET, BURR AND FURNITURE SPRING manufacturing business in which Loring & Parks are extensively engaged is not included in the transfer to the Tack Corporation, but will be carried on by them as heretofore at Plymouth, Mass., in their own name and upon their own account.

D. G. McMILLAN, senior member of the firm of McMillan Bros., manufacturers of the Seamless Turpentine Still and general metal workers, Fayetteville, N. C., and Savannah, Ga., died in the latter city on Tuesday, May 12. The surviving partners, R. and T. H. McMillan, announce that the business will not be discontinued, but will be carried on by them as heretofore under the same name and style.

PALMER HARDWARE MFG. COMPANY, Troy, N. Y., advise us that the demand for their Lawn Keeper is larger than the supply, but by greatly increasing the output they will in future be able, they hope, to ship all orders with a reasonable degree of promptness.

AS A RESULT of the formation of the Atlas Tack Corporation, the three New York stocks of concerns who are thus associated have been consolidated in the store formerly occupied by the American Tack Company, 116 Chambers street, which is the headquarters of the corporation. Frank Hobart, formerly manager of Dunbar, Hobart & Co.'s store, has been appointed general manager, with Messrs. Hadley and Field as associates.

## Trade Topics.

**Displaying Goods.**—From a Pennsylvania Hardwareman we have the following communication, which refers to the views expressed by a correspondent in our last issue, and maintains, it will be observed, the desirability of giving careful attention to the display of goods, and also embodies practical suggestions which will be of interest:

We can hardly agree with your correspondent from New York State in regard to "displaying goods in the store."

Our experience has been that the more goods we show the more we sell.

We have recently added 30 hardwood boxes neatly finished in hard oil, 8 x 14 and 10 x 17, by 4 inches in depth; these are placed on our counter and filled with seasonable goods, such as Garden Trowels, Pruning Shears, Horse and White-Wash Brushes, &c., and in consequence our sales in these lines have largely increased.

Attractive window trimming has also proved a drawing card with us.

Let our New Yorker try cleaning his windows, take the Sleigh Bells and Skates out of them and put some seasonable goods in instead, and we feel sure he will be repaid.

**Quarterly Index.**—In connection with a reference to the value of *The Iron Age* to the Hardwareman and the large amount of matter contained in its pages which is desirable for reference, a well-known Hardware concern in Colorado suggest a quarterly instead of a half-yearly index, as at present:

I was interested in the article which appeared some time ago, "How to Use *The Iron Age* in a Hardware Store," and would suggest that if you would facilitate such use by issuing an alphabetical index every three months instead of at the end of every six months, as at present, you would save thousands of overworked Hardware dealers a vast amount of trouble and many dollars.

**Protection for Retailers.**—We are in receipt of several letters relating to the sale of goods to consumers by jobbing houses and manufacturers, which confirm other advices that the retail trade throughout the country suffer a considerable loss of business on this account. It is obvious that besides the loss of profit on sales which are thus made the retailer loses indirectly but perhaps quite as seriously in prestige, as to a certain extent he is discredited to his customers, who get the impression that they can buy more advantageously from other parties. We should be glad to hear from our readers as to whether in their experience they encounter much of this annoyance. Writing on this subject to merchants who have been making an organized effort to correct this practice a New York Hardwareman writes:

I have been thinking for a long time something should be done to protect ourselves (retailers) from pirates who have no business with some of the goods they carry, say Tinware and small articles of Hardware and some Wooden Ware, which they sell at no profit. Besides, some houses who call themselves wholesalers are continually cutting prices, and with the larger means and facilities for handling goods they can do so, but it is all wrong. I am pleased to know that such a movement is being made, and hope ere long its influence will reach this neighborhood. Keep the agitation up so that the wave will reach us up this way.

With reference to the sale of goods to department stores, and some enterprises which interfere with the legitimate Hardware trade, a correspondent expresses the following views. While our readers will admit that there is considerable force in the position taken by our correspondent, it is probable that some of them will be disposed to dissent:

The retailer doubtless has just reason for complaint when the wholesale house from whom he buys his goods retails to the dealer's legitimate trade at any price. The dealer has bought his goods with at least the implied understanding that he is to be protected in his own territory against the wholesale house from whom he purchases. The matter of dictating to the wholesale house or manufacturer to what class of retail merchants he can or cannot dispose of his wares is, however, an entirely different matter. Because a furniture dealer or dry goods merchant, by reason of business ability or command of money, can make more advan-

tageous terms upon which to purchase goods, can scarcely be regarded as a sufficient reason why a wholesaler or manufacturer should be debarred from making such his customer. We have sympathy with any movement by which the retailer may protect himself against the jobber and manufacturer, but do not see how he can expect protection against other retail merchants, unless he is able by lower prices or other inducements to gain custom.

## Prospects in the Northwest.

THE FOLLOWING report from Lee-Clarke-Andresen Hardware Company, Omaha, Neb., was inadvertently omitted from our last issue. Giving information as it does in regard to the crops and the outlook for trade it is of interest:

The question as to the outlook for the crops is one that interests every business man nowadays fully as much as it interests the farmer himself. No review of trade conditions would be complete without due reference to this most important factor. So far as can be judged from present indications, the farm crops of the country west of us will be all that could be desired. At present everything is in the very best condition, the ground is thoroughly saturated with moisture, and the weather could hardly be more perfect for germinating the grain placed in the ground. The general impression prevails that we are to have both a large acreage and a large yield this season. The latter, of course, is prophecy, but as to the acreage it is possible to arrive at something definite, and the sources of information on this point confirm a considerable increase in wheat, oats, corn, &c. The fruit crop this year promises to eclipse any former season. In this section this crop is very unreliable, but the conditions and indications at this time are more than favorable for a very large yield. The movement of goods during the past two weeks under review has been highly satisfactory. Orders keep coming forward thick and fast, and, while dealers generally seem to be cautious and careful in purchasing, the large number of orders received aggregate a very respectable volume. The best of feeling seems to prevail throughout the country generally, and with a reasonable amount of enthusiasm over the future outlook. This is especially noticeable among people from those sections of the country which suffered most from last season's crop failures. Collections are fair and money comparatively easy in all quarters.

## Hardware and Stove

### Dealers' Association.

THE REGULAR MEETING of the Hardware and Stove Dealers' Association was held in Brooklyn on the evening of the 26th inst. Several new members joined the association from New York, Brooklyn and Jersey City. Encouraging reports of progress were received from members, and a satisfactory report regarding the financial condition of the association was made by the treasurer. It was decided that the monthly dues of 25 cents should begin on June 1. The next meeting of the association will be held on June 9 in New York, in the vicinity of Third avenue and Thirty-fourth street. Further notice of the place of meeting will be given in a later issue.

## Schiller House-Furnishing Company.

THE SCHILLER HOUSE-FURNISHING COMPANY, 563 North Clark street, Chicago, have a Hardware store which is an admirable illustration of effectiveness in economizing space. The storeroom is situated in a building 17 feet 6 inches wide in the clear, but a hall and stairway narrow the

sides of the store and across the center. The joists of the gallery are 6½ feet from the floor, and being 6 inches deep leave 6 feet above to the ceiling. It is supported partly by the walls of the building and partly by hangers of original design, thus described: Heavy screw hooks have been screwed into the ceiling joists, and a piece of ½-inch gas-pipe attached thereto by chandelier hooks screwed on the end of the pipe. The pipe passes through the platform of the gallery and has a gas-fit-

Silverware, having the space under it utilized by drawers for Egg Beaters, Pot Cleaners, and other small kitchen utensils, while below the top drawers in front are cases with sliding glass doors,

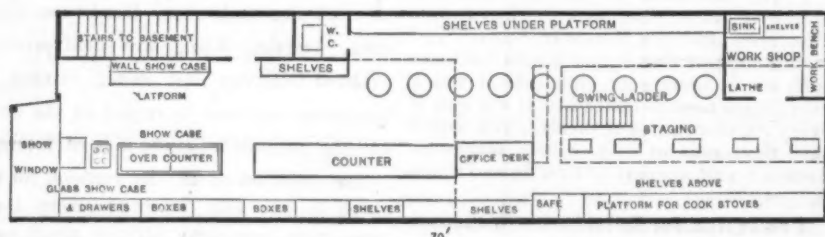


Fig. 662.—Ground Plan of Schiller House-Furnishing Co.'s Store.

front to only 14 feet. The extreme depth of the building is 70 feet from the front of the show window. The ceiling is but 13 feet high. Within this space a stock of goods valued at \$5000 is carried, but is so arranged that it does not seem to be crowded. Ready access can be had to all parts of the store. Special attention is paid by the firm to the house-furnishing trade, but at the same time a full line of Mechanics' Tools and Builders' Hardware

ter's floor flange screwed on the bottom, so that it can be tightened if it should be necessary. The gallery thus built is perfectly rigid and seems to be thoroughly secure. Access to the gallery is secured by a step-ladder, as shown in the ground plan, Fig. 662. The top of the ladder is hinged to the platform of the gallery. A rope passes from the bottom of the ladder through a pulley in the ceiling across to another pulley at the side of the room, where a weight is hung, which acts as a counter-balance to keep the ladder suspended out of the way when not in use.

Passing to a description of the arrangement of the front of the store, it may be mentioned, first, that the window is attractively dressed. The articles in it are

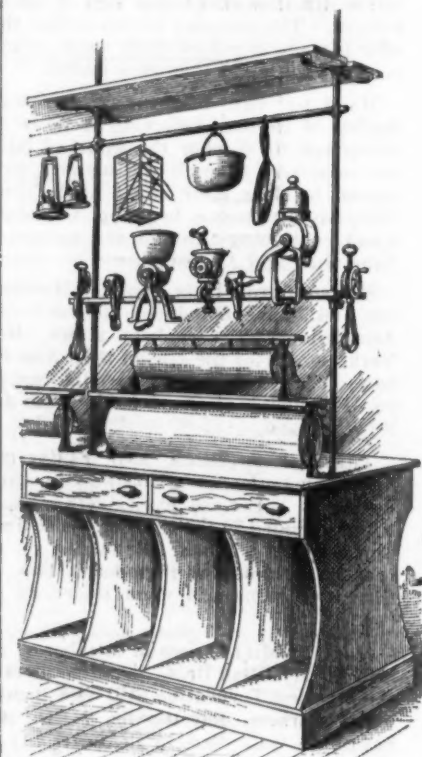


Fig. 666.—End of Counter Nearest the Door.

through which are seen Coffee and Tea pots, Sad Irons, Cake Dishes, &c. Over drawers are arranged in the rear. A cross section of this case is shown in Fig. 663. Suspended from the ceiling over this show case is a rack holding Feather

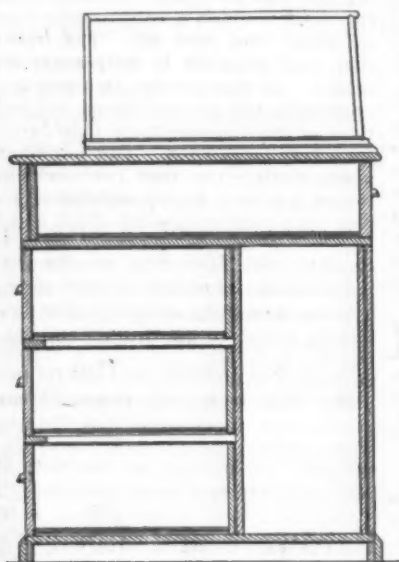


Fig. 663.—Cross Section of Counter Under Show Case.

is kept in stock. The arrangement of the store will be better understood by reference to the ground plan, as given in Fig. 662. The dotted lines on this plan show the location of a gallery or staging in the rear of the store.

It will be observed that a gallery crosses the store almost midway. The part in front of the balcony is occupied by counters, show cases and racks for the display of goods. The back part of the store is used for Stoves, Tinware and other goods occupying considerable space and not usually kept under glass or in boxes. The gallery, as will be seen, extends along two

the prettiest and most showy in the stock. A square, high glass case contains a great variety of Dog Collars and Dog Whips. The top of this case is used for displaying Granite Ware Coffee and Tea Pots. Grouped on the floor under this case and around it are Gas Stoves. The next show case is a long one, used for Cutlery and

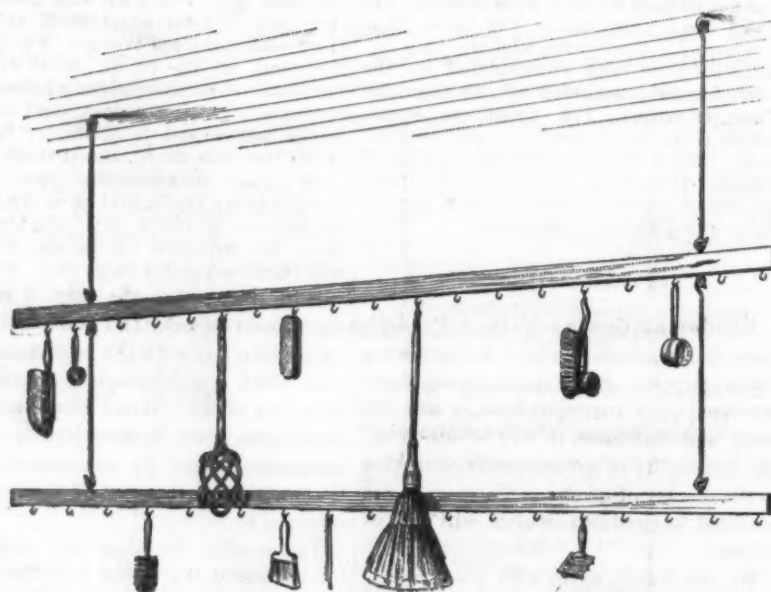


Fig. 664.—Suspended Rack for Dusters, Etc.

Dusters, Brushes, Whisks and similar goods. It consists of cross pieces of light wood, hung from screw-eyes in the ceiling by wire hooks. Small screw hooks are fastened in the cross pieces, the whole arrangement being shown in Fig. 664.

Next comes a counter with drawers at the top and nail bins below. The top is



partly occupied by wrapping paper racks, leaving sufficient room for arranging parcels and tying up goods. The space above this counter is utilized for an ingeniously arranged rack and shelving. The frame-work of this rack is of half-

of sections of gas pipe 1 foot long, which are screwed into double T joints, so that arms of curved gas pipe can be attached as shown in Fig. 667.

These curved arms are used for holding rolls of Wire Cloth in the summer, Fig.

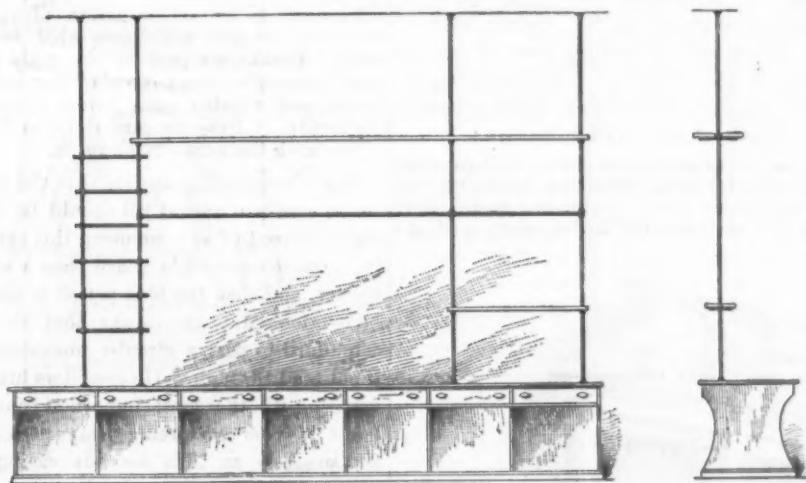


Fig. 665.—Front and End View of Counter With Gas-Pipe Rack.

inch gas pipe. Upright pieces are secured at the ceiling and on the counter by gas-fitters' floor flanges. An outline of the whole arrangement is given in Fig. 665.

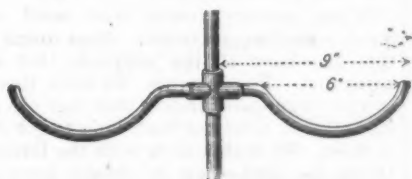


Fig. 667.—Arms of Curved Gas Pipe.

The arrangement at the end of the counter nearest the door is shown in Fig. 666. Rolls of wrapping paper are seen, while above them on a cross bar attached to the gas-pipe supports are such goods as are fastened by thumb-screws, being

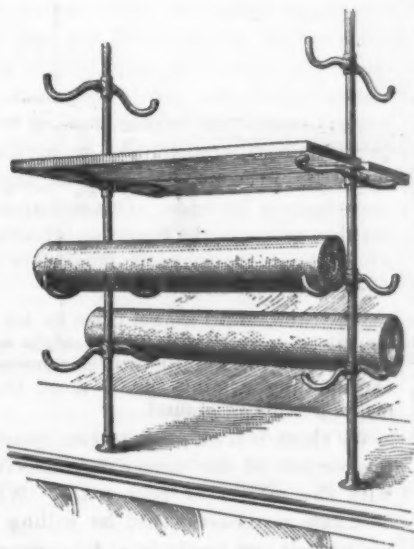


Fig. 668.—Gas-Pipe Uprights.

Cherry Stoners, Vises, Meat Choppers, Apple Parers, Egg Beaters, &c.

At the further end of this counter there are two gas-pipe uprights placed 18 inches apart. These uprights are formed

668, and in other seasons they are screwed around so as to lie flat and then form supports for shelves, which are made of inch boards 3 feet long by 11 inches wide, having slots sawed in the ends, so that they can be slipped into the space between the uprights. As utilized in the winter, these shelves appear as shown in Fig. 669.

A long shelf above, which extends the full length of the counter and is supported

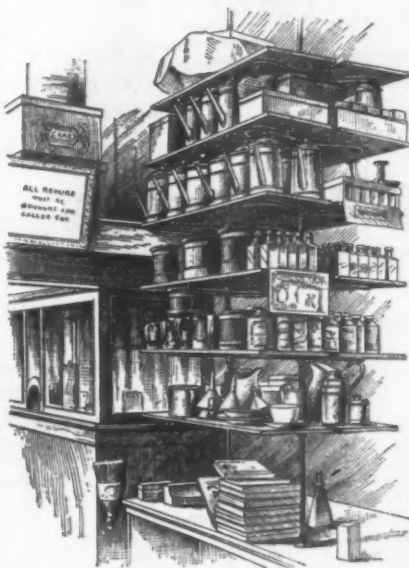


Fig. 669.—Gas Uprights, as used in Winter.

by the gas-pipe uprights, is used for Sugar Boxes and other articles of Tinware, while Bird Cages are suspended from hooks on its under side. A cross section of the counter under consideration is shown in Fig. 670.

Back of the show cases and counters the goods are arranged in upright glass cases and shelving along the wall. Fig. 671 shows the arrangement nearest the show window of the store. Drawers and bins are built below, extending 18 inches out from the wall and 2 feet 9 inches high.

Above them is a ledge 6 1/2 inches wide, the shelving above being about 12 inches deep. The glass case shown contains Saws, Levels, Squares, Chisels and other tools, and Wicker Knife Trays and Baskets are on the upper shelves. Boxes coming next are made of 1/2 inch stuff, nailed with wire nails, and fit the spaces perfectly between the shelves. Each is fitted with a white knob as a pull and a sample of the contents is tacked on the outside. The fronts of these boxes are painted green. They contain all kinds of small wares, such as Hinges, Hooks, Harness Rings, Padlocks, Door Latches, Staples, &c. The space below the ledge is used for storing Sad

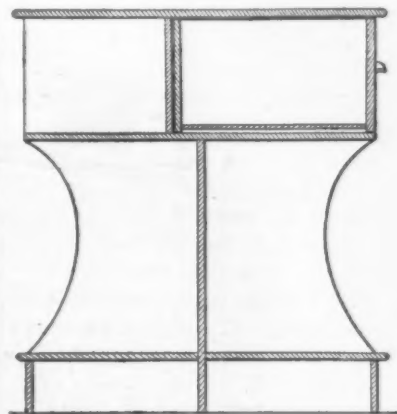


Fig. 670.—Cross Section of the Counter.

Irons, Hammers, Sand Paper, Cordage, Rolling Pins, &c.

Following three sections of boxes come open shelves for holding papered goods, such as Tacks, Thumb Latches, Key Blanks, Screws, &c. Below part of these open shelves is a Bolt rack with 28 compartments, each about 7 x 8 inches and 18 inches deep. This completes one side of the store from the front to the gallery.

On the other side of the store the wall space immediately back of the door is used for hanging Dust Pans, Coal Shovels and other articles comparatively flat. Next comes a system of shelving built to suit the space. The surface



Fig. 672.—Portion of the Gallery.

is broken by a door leading to the basement. On the left of the door a case with glass doors is supported on brackets placed about 4 feet from the floor. The case contains Fancy Goods, such as Brass

Tea Kettles, Nickered Coffee and Tea Pots, &c. Drawers for Table Cutlery are attached to the bottom of this case. The space below is utilized for displaying Gas Stoves, Clothes Wringers, Fire Sets, &c.

On the right side of the basement door the shelves are open and extend to the floor. They are used for Granite and other Enamelled Ware. The shelves near the ceiling are used for large Tinware articles, such as Sprinkling Pots, Oil Cans, Galvanized Buckets, &c. Coal Hods are suspended from hooks fastened to the ceiling.

Next follows shelving for Saucepans, Spiders, Pudding Dishes, &c. Shelving

## A Substitute for the Waste Basket.

A HARDWARE jobber in a Missouri city, who also deals largely in Farm Machinery, Buggies and Carriages, in addition to the regular stock of goods, sends the following plan for taking care of circulars and of making them of use to him in his business. After referring to the article on this subject, which appeared in *The Iron Age*, April 2, he says:

After trying almost every system ever devised for filing circulars, including the Prize-Essay systems published in *The Iron Age*, I have adopted the following method.

an inch, tacked to the drawer, and slip the label card with number in this tin; in this way the numbers can be changed as my business may change. As soon as these drawers get rather full I have some taken out, tied up and labeled with a shipping tag plainly marked with the same blue number. This is the only system I have ever found that did not soon result in an accumulation of circulars that I would not know what to do with. I make it a part of my daily routine to examine every circular that comes to me, and number each before it leaves my hands. I have my card right in front of me with the numbers all on it.

Our correspondent insists that the numbered card and vacant till should be kept right in front of any one using this system in a more convenient place than a waste basket, and that the blue pencil is not to be overlooked. He thinks that no one can afford to pass a circular unexamined, if not read through. He considers his advertising till the most important one he has. Whenever a circular impresses him and suggests an idea for advertising he puts it in No. 3.

## Poor Country Roads.

IN A COMMUNICATION from a prominent Hardware merchant in Ohio, attention is directed to the undesirable condition of the country roads, especially in the early part of the year. He says:

What country towns most need are good, sound wagon roads. Most towns of this size have all the railroads that are necessary. For instance, we have three; so that drummers, finding that they can do no business, need not wait long to get out of town. So it should be with the farmer. When he hitches up he should have no trouble to get to town. The facts are that in this part of the country it has been hard work to get into town for the past four months.

He mentions a case where two or three teams were stuck in the mud in an adjoining town, and were obliged to unhitch, leaving their wagons to be pulled out at some future date. As a remedy, he thinks county commissioners ought to make a levy large enough to build one or two roads a year, which would not only increase the value of property, but the merchants would be greatly benefited, as farmers would then be able to get to town in all kinds of weather. In an agricultural district the merchants depend largely upon farmers for trade. Our correspondent then refers to the condition of affairs when the roads make it impossible for farmers to come to town.

When the farmer cannot come to see us we are at a standstill, or we might say, sliding backward. Bills will accumulate, and nothing coming in to meet them makes trouble all around.

We think it is only fair to also consider the comfort of the farmer, in connection with the subject of poor roads. What hardware merchant would be willing to put himself and family in a farm wagon, with a spring seat, and have his team walk four, six or eight miles each way, to and from town, through mud or over ruts? It may be that the farmers and their families are accustomed to it, but it is uncomfortable, nevertheless. We know of a Western town of 10,000 inhabitants which was



Fig. 671.—Glass Cases and Shelving.

for Tinware in general runs along on this side under the gallery. A line of Heating Stoves stands in front, but enough room is left between to permit easy access to everything.

Across the store, also under the gallery, in the rear, are other shelves devoted to Tinware, with a line of Cook Stoves in front of them.

The gallery is used for storing Bread and Flour Boxes, Portable Bathtubs, Stove Boards in racks, Clothes Horses, &c. The gallery also permits access to upper shelves holding Tinware and racks for Stove Pipe, Spades and Shovels, &c. A portion of the gallery is shown in Fig. 672.

Every possible inch of space thus seems to be utilized. Even the sides of the inclosure forming the office are hung with Buck Saws and other articles which can be thus displayed. The firm exclusively handle Garland Stoves and Ranges and Clark's Jewel Gas Stoves.

I make a classified card, alphabetically arranged, of goods in my line as follows:

- |  |    |
|--|----|
| 1. Agricultural Implements, light.   | 1  |
| 2. " " heavy.  | 2  |
| 3. Advertising suggestions, &c.  | 3  |
| 4. Guns and Sporting Goods.  | 4  |
| 5. Hardware, Sundries.   | 5  |
| 6. " Staple.   | 6  |
| 7. Harness.  | 7  |
| 8. Lamps and Lamp Fixtures.  | 8  |
| 9. Oils and Paints, Roofing.   | 9  |
| 10. Pumps, Hoes, Belting.  | 10 |
| 11. Stoves and Furnaces.   | 11 |
| 12. Stationery and Printing Department.  | 12 |
| 13. Sundries and Wire Work.  | 13 |
| 14. Tinware and Housefurnishing.   | 14 |
| 15. Vehicles, all classes.   | 15 |
| 16. Wooden Ware and Sewing Machines.   | 16 |
| Three large special boxes, one each for <i>The Iron Age</i> , <i>The Metal Worker</i> and other periodicals. |    |

I always carry a Faber's blue pencil in my pocket. When circulars come in I inspect them and number each in large blue figures. I have a large vacant till or pigeon hole in my desk, into which I throw them after they are numbered, and require a clerk to make it his business to keep this till pretty well emptied by filing them in numbered drawers. I label the drawers with pieces of tin  $\frac{1}{4}$  x 10 inches, turned on each side an eighth of



exactly in the same position as the one under discussion. They did not have a road leading from town in any direction that was passable in the spring of the year. The county was paying all the road tax that it could afford; which tax was expended each year in having the wash which had accumulated by the side of the road plowed up and scraped upon the road bed. This method does not produce good results, especially when done by farmers who know nothing of practical road building. The outcome was the merchants took the matter in hand and contributed enough money to secure a solid gravel roadbed first in one direction and afterward in others. This expenditure has resulted in more real good to the merchants than had many times the

New Form of Chain List.

BAKER CHAIN AND WAGON IRON Mfg. Company, Allegheny, Pa., have recently issued their Chain list in the form indicated below. This list is exceptionally complete, giving prices of Chain with proof test, breaking strain and weight per fathom, on Proof Coil and Cable Chain, Crane Chain, B. B. Crane Chain, Best Special "Baker" Crane Chain and Stud Link Cable, in sizes from 1/8 inch to 2 1/2 inch. The diagram given below, which is for the purpose of illustrating the arrangement of the list, represents only a portion of it and omits altogether Best Special "Baker" Chain and Stud Link Cable. We are advised by the company that the figures under the head of

and medium grade Wheels, together with Tricycle and Cycle accessories. They make the following suggestion to the trade: "If you do not include Bicycles or their accessories in your stock, we would suggest that you consider adding this department to your business. The demand is increasing, and you can arrange to supply and do a paying trade without any risk or much additional expense."

NASON MFG. COMPANY, 71 Beekman street, New York, under date of May 20 issue a manufacturers' trade sheet of discounts from prices as given in their catalogue of August, 1889. This is accompanied by a budget of circulars relating to Valves, Fittings, Gauges, &c., Nason's Vertical Wrought-Iron Welded Tube Radiators; Monitor and Haggerty Plumbers' Furnaces, &c.

DERBY & BALL, Bellows Falls, Vt.: Swing Socket Snaths. These are made with several styles of fastenings. It is

PROOF COIL AND CABLE CHAIN.					CRANE CHAIN.					B. B. CRANE CHAIN.				
SIZE.	PRICE per 100 Lbs.	PROOF TEST.	Breaking Strain.	Weight per Fathom. Lbs.	PRICE per 100 Lbs.	PROOF TEST.	Breaking Strain.	Weight per Fathom. Lbs.		PRICE per 100 Lbs.	PROOF TEST.	Breaking Strain.	Weight per Fathom. Lbs.	
		In Tons.	In Tons.			In Tons.	In Tons.				In Tons.	In Tons.		
1/8		1/2	1	3		1/2	1	3			1/2	1	3	
3/16		3/4	1 1/2	4 1/2		3/4	1 1/2	4 1/2			3/4	1 1/2	4 1/2	
1/4		1 1/4	3	6 1/2		1 1/4	3	6 1/2			1 1/4	3	6 1/2	
5/16		2	4	9		2	4	9 1/2			2	4	9 1/2	
3/8		3	6	11 1/2		3	6	12			3	6	12	
1/2		4	8	15		4	8	15 1/2			4	8	15 1/2	
5/8		5	10	18		5	10	19			5	10	19	
3/4		6	12	23		6	12	24			6	12	24	
7/8		7	14	27		7	14	28			7	14	28	

A Portion of Baker Chain and Wagon Iron Mfg. Company's List.

amount be spent in inducing some new line of railroad to come to their town. In referring to the importance of good roads an exchange has the following:

The problem of how to improve the roads and keep them in passable condition has been one of the leading topics of the present decade, and yet very little has been accomplished in that direction. Pennsylvania has taken the most practical action of any of the States by making an appropriation for the improvement of roads. Ohio, once famous for its pikes, perhaps takes better care of its roads after they have been improved than any of the States west of the Mississippi, but the day is not far distant when the care of wagon roads will be regarded as important as the watchfulness exercised over the physical condition of railroads. The wagon road must be depended upon as a feeder for all time to come. There are already too many railroads in certain sections of the country. If more are built the shipper will not be benefited as much as if they are left unbuilt. The roads must be looked after more systematically than at present. When there are bad roads the effect is immediately apparent in the lull that strikes trade, often reaching to a wide area of country, and temporarily arousing those affected to a realization of the advantages accruing from good roadways. Let the agitation be continued until some means of keeping the roads in better shape is hit upon. The matter is one of vital importance.

HENRY B. NEWHALL COMPANY, 105 Chambers street, New York: Circulars giving in convenient form Common Carriage Bolt list, sizes of Angles, Beams and Channels manufactured by Oliver Iron and Steel Company and a list of the houses for whom the Company are agents.

"Breaking Strain," especially in the higher grades of Chain, are very conservative and that the average of actual tests was from 10 to 15 per cent. higher.

Price-Lists, Circulars, &c.

C. S. BELL & CO., Hillsboro, Ohio: Steel Alloy Church and School Bells. In their catalogue No. 40 the manufacturers state that the Bells are made of an alloy of cast steel and crystal metal peculiar to themselves, and are not intended to compete with the common iron Bell; also that the volume of sound and purity of tone are increased as the Bells are used.

COVENTRY MACHINISTS' COMPANY, Coventry, England, and 239 Columbus avenue, Boston: Catalogue of Swift Cycles. They remark that these Wheels are Swift by name and swift by nature, and that correct proportions, not weight, give strength. They state that their company is the oldest firm in the business, having made Bicycles some 32 years; and now employ about 1200 men, with an excellent plant of machinery.

CHAS. F. STOKES MFG. COMPANY, Chicago, Ill.: 1891 catalogue, calling attention to the Union Cycles, for which they are Western agents, and also to the line of medium grade machines which they handle. They state that the success achieved by their company in the past may be traced to the steady application of judicious and energetic business methods, coupled with square and honorable treatment in all their dealings.

GEO. R. BIDWELL CYCLE COMPANY, 308 and 310 West Fifty-ninth street, New York, and 270 and 272 Wabash avenue Chicago: Illustrated descriptive catalogue of the Safety Bicycles handled by them. This includes a line of both high

stated that by the use of the Patent Loop and Patent Swing Socket fastening the Scythe may be set in any position or angle without bending the shank or twisting the edge. The manufacturers advise us that they are having an increasing demand for these goods.

DAME, STODDARD & KENDALL, Boston: Sporting and Athletic Goods. Their 1891 catalogue of 80 pages contains illustrations and prices of Tennis Goods, Outing Clothing, Bicycle Clothing, Base Ball Goods, Cricket Goods, Fencing Foils, Gymnasium and Athletic Clothing, Bicycles, Bicycle Sundries, Light Gymnasium and Calisthenic Goods, Athletic Appliances, &c. The above firm state that this catalogue, which they have made as complete as possible, falls far short of mentioning all of their goods, as they are making additions to their stock every day. The catalogue is very complete and well arranged, and will be valued by the trade.

NEW HAVEN WIRE MFG. COMPANY, New Haven, Conn.: Drawers of Wire in great variety and manufacturers of Steel Wire Nails. A catalogue giving illustrations and price of Wire Nails; miscellaneous Wire Nail list, with prices in 1, 5 and 10 pound packages; standard list prices of Wire; a table indicating size, weight and length of Wire, and a table of their new standard gauges. The information contained is very complete, and is valuable for reference.

LAMSON CONSOLIDATED STORE SERVICE COMPANY, Boston: Lamson Cash Registers. These are made in a variety of styles, for use where even amounts of 5 cents and upward are desired to those which make a check from 1 cent to \$100. A guarantee of two years is given with every Register. It is stated that every Register is tested under high-speed belt before leaving the factory, and that such a thing as the return of a machine for imperfection is unheard of.

MARTIN SINGLETREE CLIP COMPANY, Evansville, Ind.: Clips for Single and Double Trees. The manufacturers, referring to these goods, claim that they cannot rattle, do not allow the Singletree to tip forward, and will not split the Doubletree; also that there are no angles or points to pull hair from horses' tails, and that they will outlast the best work produced. It is stated that these Clips are used by more than 100 large manufacturers. They are applicable to carriages, buggies, carts and spring wagons.

### Remittance Blank.

WE ARE INDEBTED to Sprague Bros., Greenville, Mich., for the following form of remittance blank, which they advise us they have been using for some time. This blank, which is called out by the publication of another

That L. C. Blake, dealer in Stoves and Tinware, Harrison, Maine, has sold out to H. H. Caswell. Mr. Caswell is building a new store, which he hopes to occupy in the near future.

That E. N. Trader has opened a Hardware store at Reynoldsville, Pa.

That the fire which destroyed nearly the entire business portion of North Rose, N. Y., included in its ravages the Hardware store of Welch Brothers.

That the partnership under the style of Francis & Reeves, dealers in Hardware, Stoves and Agricultural Implements, Gettysburg, S. D., has been dissolved. Mr. Francis has purchased his partner's interest.

That the Macon Hardware Company, Macon, Ga., have been organized, with a capital stock of \$100,000. The following are the officers of the company: President, H. C. Tindall; vice-president, John

That James Cassin, assignee of the firm of Snyder-Robinson Hardware Company, Ogden, Utah, has disposed of the company's stock and interest to Hornby Bros., who have establishments at Provo City, Utah, and Valentine, Neb. The Messrs. Hornby will continue the business on a higher scale.

That Brown & Reed, Hardware, West Boylston, Mass., have sold out their business to E. O. Bacon.

That L. W. Cannon will open a new Hardware store in Des Moines, Iowa, at an early date.

That A. J. Fiske, W. Newton, Mass., plumber and dealer in Stoves and Tin, has fitted up a Hardware department in his store. He has recently purchased the Hardware stock of Alonzo Whitney, to which he has added a complete line of goods for builders' and family use.

That D. S. Walker, Hardware dealer at Perry, N. Y., has sold out to M. H. Olin & Son.

That Wilbur A. Johnson will engage in the Hardware business at Harriman, Tenn.

That S. A. Brock, Malden, Mass., will open up his store with a full line of Hardware, Kitchen Furnishings, &c., June 1.

That the Chapman Hardware Company, Toledo, Ohio, have had their capital stock increased from \$15,000 to \$20,000.

That Peter Walter will soon engage in the Hardware business at Lansing, Mich.

### Exports.

PER SHIP PINMORE, MAY 11, 1891, FOR  
MELBOURNE, AUSTRALIA.

By R. W. Cameron & Co.—5 cases Axles, 4 packages Pumps and parts, 2676 pounds Axles.

By Richard Irwin & Co.—26½ dozen Bird Cages.

By Simpson, Hall, Miller & Co.—17 packages Britannia Ware.

By Alfred Field & Co.—40 Axles.

By Collins & Co.—100 dozen Handled Axes.

By Sherman & Logan.—3 packages Pumps.

By H. B. Moore.—111 cases Agricultural Machinery.

By Russell & Erwin Mfg. Company.—15 cases Hardware.

By H. B. Moore.—20 Refrigerators.

By Russell & Erwin Mfg. Company.—21 cases Hardware, 15 kegs Nails.

By Woodhouse & Stortz.—21 packages Hardware, 4 packages Lamp Goods, 12 boxes Stoves.

By Wm. C. Barker Company.—15 cases Ice-Cream Freezers.

By Mailler & Quereau.—750 pounds Axles.

By Healy & Earl.—3 barrels Electric Lamps.

PER SHIP MACEDON, MAY 12, 1891, FOR  
SYDNEY, N. S. W.

By Wilcox Silver Plate Company.—6 packages Plated Ware.

By Collins & Co.—220 dozen Handled Axes.

By Gould's Mfg. Company.—49 Pumps.

By Manhattan Brass Company.—6 cases and 9 packages Brass Goods, 9 packages Lamp Goods, 5 cases Brass Goods.

By W. K. Freeman.—4 boxes Scales, 1 box Drills, 31 dozen Hatchets, Axes, &c., 9 packages Lawn Mowers.

By Edward Miller & Co.—29 packages and 4 cases Lamp Goods, 32 packages Lamp Goods.

By V. Basanta.—108 Planes, 4 dozen Mallets, 1 dozen Braces, 4 dozen Saw Sets, 1 dozen Axes, 3 dozen Braces, &c.

By Strong & Troubridge.—1½ dozen Hardware, 10 dozen Cow Bells, 2 dozen Wheelbarrows, 149 Hardware, 141 pounds Plated Ware, 30 Guns and 20 sets of Tools, 12,000 Cartridges.

By H. W. Peabody & Co.—1 case Builders Hardware, 139 pounds Nails, 1 case Tacks.

By R. W. Forbes & Son.—4 packages Hardware.

By Coombs, Crosby & Eddy.—6 dozen Hammers, 4 dozen Axes, 2 dozen Picks, 2 dozen Bird Cages, 25 dozen Sad Irons, 7 dozen Wringer Fittings, 2 dozen Lawn Mowers, 26 Stoves, 20 dozen Axes, 6 dozen Wringers, 73 dozen Carpenters' Tools, 18 Lawn Mowers, 16 dozen Wringers, 732 pounds Finishing Nails, 4 Boring Machines, 224 pounds Washita Stone, 9 dozen Wrenches, 12 dozen Axes,

form in our last issue, will be recognized by our readers as convenient in its arrangement and having some merits which will commend it perhaps for more general use.

### It Is Reported—

That H. D. Bennie, Olean, N. Y., is moving his Hardware and crockery business into larger quarters.

That Geo. M. Relyea, Lee Center, N. Y., who has conducted a Hardware store at that point for the past ten years, has removed to Newport, Herkimer County, where he will continue the Hardware business.

That the Johnson-Tinney Hardware Company have been incorporated at Lafayette, Ind., with a capital of \$25,000. The company will succeed to the business formerly carried on by C. Johnson.

That Wormald & Babcock have succeeded the Hardware firm of Wormald & Roberson, Aberdeen, Wash., L. F. Babcock having purchased the interest of C. W. Roberson.

That Tobey & Burlison are the prospective proprietors of a new Hardware store at Columbus, N. Y.

That the Hardware firm of T. E. Fell & Co., Newman, Ga., has been dissolved, his partner's interest having been purchased by T. C. Johnson, who will continue the business at the old stand.

That the Hardware store of McLean & Schank, Linesville, Pa., was recently destroyed by fire. The fire was caused by the explosion of gasoline stored on the premises.

That Joseph Hare, Bismarck, N. D., has sold his Hardware and Implement business to James H. Holt.

C. Van Syckel; treasurer, W. Ross White; and secretary, Howard White. S. E. Culver will be manager of the Hardware department, John C. Van Syckel having charge of the Crockery department.

That the Hardware store of McKenney & Heard, Biddeford, Me., was robbed on the 20th inst. A considerable quantity of Knives, Razors and Scissors were stolen.

That Gleason & Morrell, Clifton, Ill., will start a new Hardware store.

That Frank Baxter has bought out the interest of Chas. Davis in the Hardware firm of Davis & Son, at Gaines Station, Mich.

That the firm of Leonard & Normandy have succeeded to the Hardware business of William Ball, Duluth, Minn., and will remove the place of business to the new Larson Building on Superior street.

That R. S. Card & Co. have succeeded Cara & Sheeley, dealers in Hardware, Whitesboro, Texas.

That W. A. Rounds has opened a large stock of Hardware and Tinware at Ilwaco, Ore.

That William Hoffman is about to engage in the Hardware business at Kensington, Ga.

That Charles Levith will soon open a Hardware store in Stockwell's Block, Webster, Mass.

That the Hardware store of Moses Brady, Lockport, N. Y., was damaged by fire on the 16th inst. The loss is about \$1000.

That the store of C. L. Porter, South Fallsburg, N. Y., dealer in Hardware, was slightly damaged by fire on the 10th inst.

Greenville, Mich., ..... 189 .

Gents:

Inclosed find draft for \$..... to balance our account \$..... less discount of ..... per cent. \$.....

Please receipt and oblige,

Yours truly,

Sprague Bros.

Amount of Draft, .....

" " Discount, .....

" " Account, .....



120 dozen Hardware, 2 gross Hardware, 31 gross Fruit Jars.

By *S. Hoffnung & Co.*—18 Wringers, 6 gross Tinware, 3 dozen Stepladders, 10 Rifles, 15 dozen Wrenches, 14 dozen Saws, 20 dozen Rakes, 8 dozen Tack Pulls, 21 dozen Braces, 4½ gross Traps, 30 dozen Hoes, 4 gross Lamp Goods, 116 dozen Lamp Ware, 2 dozen Wagon Jacks, 2 dozen Saw Sets, 2 dozen Traps, 15 dozen Wrenches, 23 dozen Lamp Goods, 48 Stoves, 2 gross Forks, 3 dozen Hammocks, 3 dozen Lamp Goods, 338 dozen Edge Tools, 25 dozen Locks, 224 pounds Washita Stone, 6 dozen Grindstone Fixtures, 48 dozen Cow Bells, 10 dozen Hinges, 14,000 Cartridge Shells, 10,000 Empty Shells, 100,000 Primers, 10,000 Cartridges, 40 Guns and 20 sets Tools.

By *W. H. Crossman & Bro.*—2 dozen Axes, 8 cases Builders' Hardware, 59 dozen Axes, 13 boxes Carpenters' Hardware, 20 dozen Rakes, 40 dozen Snaths, 3 dozen Irons, 2 dozen Call Bells, 45 dozen Hammers, 1 gross Lemon Squeezers, 3 dozen Bench Screws, 118 sets Axes, 2 Tire Upsetters, 1500 Iron Bolts, 6 Refrigerators, 54 dozen Hoes, 3 gross Lemon Squeezers, 6 dozen Lamp Goods, 1 dozen Tire Gauges, 118 pounds Axle Clips, 18 dozen Wrenches, 5 cases Carriage Hardware, 1 case Builders' Hardware, 8 Churns, 6 dozen Lemon Squeezers, 12 dozen Picks, 30 dozen Axes, 24 dozen Rakes, 1½ dozen Grindstone Fixtures, 14 dozen Rakes, 6 packages Builders' Hardware.

By *Australasian-American Shipping Company.*—176,000 Metallic Cartridges, 18 cases Axes, 75 Lawn Mowers, 680 pounds Axes, 3000 Metallic Cartridges.

By *Arkell & Douglas.*—2 dozen Churns, 1200 feet Hose, 60 Stoves, 75 dozen Axes, 120 dozen Lampware, 3 dozen Mallets, 10 dozen Axes, 1 dozen Buckets, 120 dozen Blocks, 2½ gross Metal Polish, 9000 pounds Bolts, 1 dozen Bolt Clippers, 18 dozen Lanterns, 1830 pounds Bolts, 900 pounds Tacks, 230 dozen Files, 2½ dozen Churns, 129 dozen Lampware, 2 Scales, 2 dozen Pumps, 250 dozen Forks, 60 dozen Rakes, 50 dozen Snaths, 109 dozen Axes, 3½ dozen Churns, 153 dozen Fruit Jars, 11 dozen Axes, 8 Stoves.

## Paints and Colors.

*It should be understood that the prices quoted in this column are strictly those current in the wholesale market, and that higher prices are paid for retail lots. The quality of goods frequently necessitates a considerable range of prices.*

The market is without feature calling for special remark. Distribution proceeds in about the usual manner and is fully as large as customary at this season of the year. There are no outside influences at work that would tend to either stimulate buying or operate in the reverse direction, and within the trade the conditions are favorable to a good, steady movement, nothing more or less. Changes in values have been few and unimportant, rarely extending beyond the bounds of ordinary fluctuation, and at present there are no signs of impending radical changes in any line.

**White Lead.**—Rather higher cost of Pig Lead that has been established during the past week has the effect of holding in check any tendency that may exist to figure upon modified prices for pure White Lead, and firmness in the market for base materials used in the manufacture of Mixed Leads serves to steady the market for the latter. By themselves these circumstances might not count for much, except in a superficial way; but existing as they do along with a good, steady movement in the several classes of pigment, they give the market more or less tone. As to the general distribution, reports are an almost exact repetition of those given previously this month, and there seems to be nothing in the way of a full average distribution at steady prices during the early summer months.

**Zincs.**—The movement of American Oxide continues on a liberal scale, and the output of manufacturers is taken up very closely. New orders, while not particularly heavy, are sufficient to virtually mortgage the output for a month or six weeks ahead and render it a comparatively easy matter for manufacturers to

mark prices up, should they feel so disposed. As yet no changes have been made, and some doubt exists as to the propriety of taking advantage of present conditions by influential manufacturers. Hence old rates prevail, and seem likely to be kept in force during the summer season at least.

**Colors, &c.**—In the market for Dry Colors there is a good, steady trade. Grinders are taking fully the average quantities of staples and specialties used in their line, and the movement of house-painters' supplies is full enough to leave no cause for complaint. Oil Colors are moving off in fairly good shape also, and there seems to be no cause for complaint as to the volume of business in prepared Paints. Changes in values are slight, and, with a few unimportant exceptions, the market remains firm.

**Miscellaneous.**—Arrivals of Block Chalk have been quite extensive, but nearly all went direct to consumers on previous purchases. Considerable quantities are yet due and meet the wants of the trade so far ahead that there is no fresh interest in cargo lots. Competition in Whiting continues keen between manufacturers here and at other points, more particularly in the instance of common grade, orders for which are still taken at prices as low as 30¢ @ 100 lb. There is also a sharp contest for business in Putty, and prices quoted by manufacturers are more frequently shaded than adhered to where orders involving good-sized lots are involved. In Paris White there is about the usual movement, and, while the former range of prices is quoted on both domestic and foreign brands, irregular rates are found on actual sales. Barytes finds fair sale at about the same prices that have ruled for two or three weeks. The lower grades of Terra Alba are selling at irregular prices, but high-grade stock remains quite steady. China Clay and Talc are without change as to prices, and moving rather slowly.

## Oils and Turpentine.

In the Oil trade there has been very little change; enough, perhaps, to make certain branches of the market interesting, but not sufficient to have any decided bearing upon either buyers' or sellers' movements. The complications in the Linseed Oil branch, for example, keep interest lively, although not assuming shape that would cause alarm. Then the approach of the new fishing season prompts more than ordinary interest among both home trade and export buyers of Menhaden Oil, and the pendulations of values of Lard and inferior greases have a certain bearing upon various Oils that is not overlooked. It would appear, however, that the general distribution is going on in a fairly satisfactory manner, and changes in prices are not as numerous or extensive as might be expected under the variety of influences at work.

**Linseed Oil.**—There have been no new developments during the past week. Out of town brands of Oil are still selling at somewhat irregular prices in this as well as in other markets, and the movements of the Western interest are watched with more than curious interest by local crushers. Evidence is found of some manipulation of the market for Seed, as well as irregularities in selling prices of Oil, but this complication has not seriously disturbed the equilibrium of city crushers, and while matters are not in wholly satisfactory shape, the local interest adhere steadfastly to old prices. While this uncertainty as to values exists and causes some uneasiness, it does not appear that the distribution is affected. In any event, current sales are quite up to the average, and the demand is fairly large.

**Cotton-Seed Oils.**—The export inquiry referred to last week has gained no head-

way. Limits on price were fixed at a point that has obstructed business, and in the absence of any concessions on the part of sellers little has been accomplished outside of merely commonplace sales to the home trade. What trades have been put through were at practically the same prices that ruled a week ago. Supplies here and at the South are said to be well under control and the market in a condition to quickly feel the impulse of a more urgent demand from either export or home buyers.

**Lard Oil.**—In the absence of any further radical change in the cost of raw material the market for Lard Oil has remained practically the same as outlined last week. Neither local pressers nor out of town competitors offer their product more freely or at any further concession on price, although business has been slow and the demand tame.

**Menhaden Oil.**—Exporters have taken an additional 700 barrels of crude Oil, making about 2000 barrels purchased since the beginning of the month at about 25¢. This cuts the stock in first hands down to small proportions, and the outcome of the new fishing season is now the important factor in regulating values. Fairly good catches have been taken in the Chesapeake Bay, and early fishing on Long Island Sound is said to be encouraging. For good quality new Oil, however, a lower offer than 25¢ is thus far ignored. The manufactured products are steady at old prices and selling very fairly in usual jobbing quantities. There has been no change whatever in the market for Sperm or Whale Oils.

**Miscellaneous.**—Olive Oil in barrels is down to 68¢ @ 70¢, and finds slow sale at the decline. Coconut Oil is moving from store in small quantities at steady prices, but stock afloat and for shipment is offering at 1½¢ @ 1½¢ less. Palm Oil is quiet but steady.

**Spirits Turpentine.**—Under the influence of accumulation of supplies here and at Southern centers that usually takes place at this season of the year, prices have been moving steadily on the downward grade. At this writing there are sellers of regular barrels at 37½¢ and machine barrels at 38¢, on the spot. Toward the close of the week there was a freer movement, under which prices advanced to 38¢ and 38½¢ respectively.

Geo. P. Bullard, for a number of years a partner in the prominent firm of Bacon & Co., Boston, Mass., is about to withdraw, and proposes to enter the general iron and steel business on his own account, with offices in the Telephone Building, 125 Milk street. Mr. Bullard announces that he has secured the New England agency of Jones & Laughlins, Limited, of Pittsburgh, Pa., and will also give considerable attention to the Swedish iron business, with which his long connection has made him familiar.

The Reeves Pulley Company, Columbus, Ind., under date of 23d inst., write: "Trade for the past few weeks has been extremely good, and, though running an extra force, are much behind orders." They have in construction three of what will probably be the largest wood split pulleys ever built. They are 14 feet in diameter and are for an Eastern thread company. They are also making some extremely large cones for Pittsburgh, Pa., establishments.

Clifton J. Morgan, treasurer of the Taylor & Boggis Foundry Company, Cleveland, Ohio, has sailed for Europe. He will be absent two or three months.

**Smith's Floor Clamps.**

G. T. Moore, 112 Chambers street, New York, is introducing floor clamps, as illustrated in Figs. 1 and 2. Fig. 1 shows a clamp for single floor, having a base 2 x 3

**Gem Vegetable Masher.**

The Chieftain Company, Canton, Ohio, are introducing a vegetable masher, as illustrated herewith. The base of the masher is  $3\frac{1}{4}$  inches in diameter, made of

**Improved Ashland Lift Pump.**

F. E. Myers & Bro., Ashland, Ohio, are introducing an improved Pump, as illustrated herewith. The manufacturers state that in the construction of this Pump every point regarding strength, easy working, convenience, design and material has been kept in sight. It is claimed that with the improved syphon spout head, the Pump throws a continuous



Fig. 1.—Single Floor Clamp.

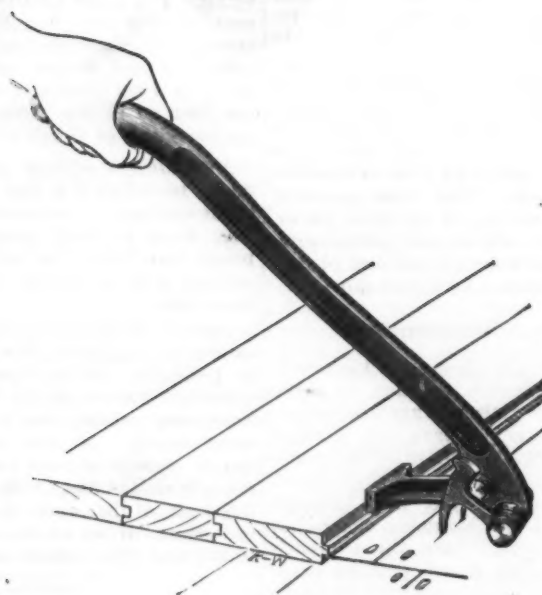
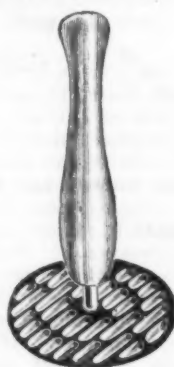


Fig. 2.—Upper Floor Clamp.

inches, which rests on the flooring joist. To the base is attached a lever, pivoted at the base and curved to the side, to allow secret or continuous nailing on the same joist as it is fastened to. For securing it to a joist is a forged hook, curved to go under the joist, made adjustable for any depth of blooming. The clamp for double flooring, as shown in Fig. 2, holds itself, it is claimed, by its own leverage, thereby giving the workman the use of both hands when nailing. The dogs are drop steel forging, which are driven into the under floor, and are within drawn by bringing the handle or lever to a vertical position.

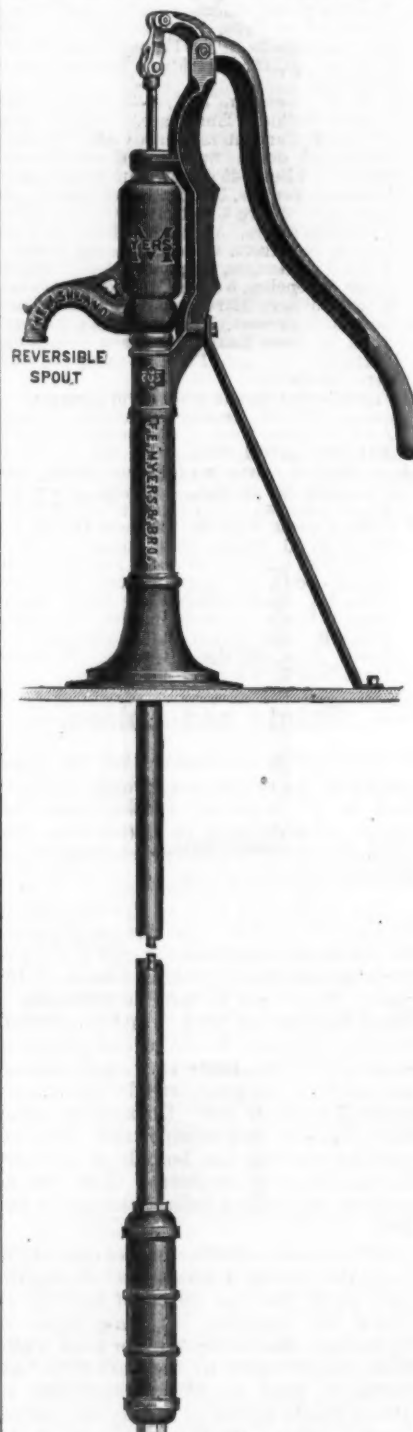
Miller, Sloss & Scott (Incorporated), is the style of a new company organized to deal in iron, steel, mining supplies and hardware at San Francisco, Cal. The firm is composed of R. W. Milligan, C. E. Miller, J. A. Scott and L. Scott all formerly with the Dunham, Carrigan & Hayden Company, of this city. The sales of the firm will be confined exclusively to the Pacific coast, and an Eastern purchasing and shipping office will be located at 145 Broadway, New York.

malleable iron heavily tinned. The handle is of hard wood neatly enameled. It is strong and durable, and is referred to as



Gem Vegetable Masher.

producing a favorable impression upon those in search of a masher. The point is made that no lumps are found in potatoes after using this masher.



Improved Ashland Lift Pump.

stream of water. The spout head is hung on centers and the spout can be reversed, so as to make the Pump either right or left hand. The point is made that the closed top prevents any dirt or sediment from getting into it. The bearing through which the piston rod operates is chilled, and the link motion allows an easy circuit of the handle without unnecessary friction. The Pump has brace and steel pins for bearings, and is finished with either silvery polished iron or brass cylinders, with the latest improved glass valve seat. They are furnished with or without windmill head. The Pump is referred to as being neat, artistic and substantial, and as possessing merit to a remarkable degree.



## Automatic Ice-Cream Freezer.

Treman, King & Co., Ithaca, N. Y., are offering the trade an automatic freezer, as shown in the accompanying illustrations. The freezer consists of three parts, the exterior jacket, Fig. 2, into which is placed finely pulverized ice and a salt solution; the sieve, Fig. 3, which is hung in the



Fig. 1.—Automatic Ice-Cream Freezer.

jacket and filled with rock salt, and the mold, Fig. 4, into which the cream or preparation to be frozen is placed. The freezer is constructed almost entirely of

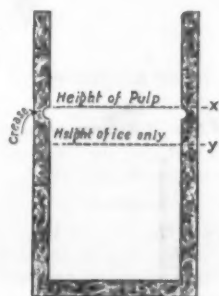


Fig. 2.—Exterior Jacket.

metal and the exterior finished and decorated in an attractive manner, Fig. 1. The Automatic is referred to as requiring much less ice than rotatory freezers, doing

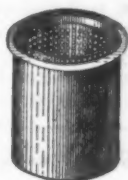


Fig. 3.—Sieve.

its work simply and avoiding all the labor and annoyance connected with the turning of cranks. The point is made



Fig. 4.—Mold.

that there is neither gearing nor other apparatus to be broken, lost, or get out of repair. The manufacturers emphasize the fact that every part of the machine with

which the cream or preparation to be frozen comes in contact is made of tin, thus doing away with the danger from the formation of oxide of zinc, as in cases where zinc is used. The manufacturers claim that if it is desired to produce a delicious, perfectly frozen cream or other preparation without labor, it can be so

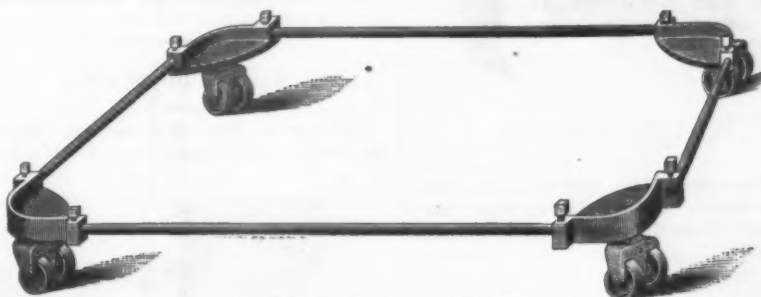


Fig. 1.—Automatic Safety Bit.

done in this freezer, and that the cream thus produced will be free from crystals. The time stated as being required to freeze cream or similar preparations is from 20 to 50 minutes, according to the size of the freezer, from the time the freezing process begins until the cream is perfectly frozen. The Automatic Freezer is intended for family use, and is made in four sizes, ranging from 3 to 8 pints.

## The Tucker Stove Truck.

Tucker and Dorsey Mfg. Company, Indianapolis, Ind., are offering the trade a Stove Truck, as illustrated herewith. It is referred to as especially constructed with a view of meeting the demand for a low-priced Truck, one that is adjustable to any size stove. It is made from steel and cast iron entirely, and is mounted on double-wheel anti-



The Tucker Stove Truck.

friction casters. The manufacturers claim that there is no surplus material to detract from its appearance; that it is exceedingly strong, neat and simple; that the adjustment may be made instantly, and that the Truck with the exhibit may be easily moved about, no matter how heavy. The point is made that by placing a board on the top of the Truck a perfect rest is obtained when a stove is to be set up.

## Automatic Safety Bit.

L. P. Britt, 63 Murray street, New York, is offering the trade a safety bit, as illustrated in Fig. 1. Its application is shown in Fig. 2. It is an ordinary bar bit with a single pair of reins, with the cheek pieces drawn short enough to cause



Fig. 2.—Application of the Automatic Safety Bit.

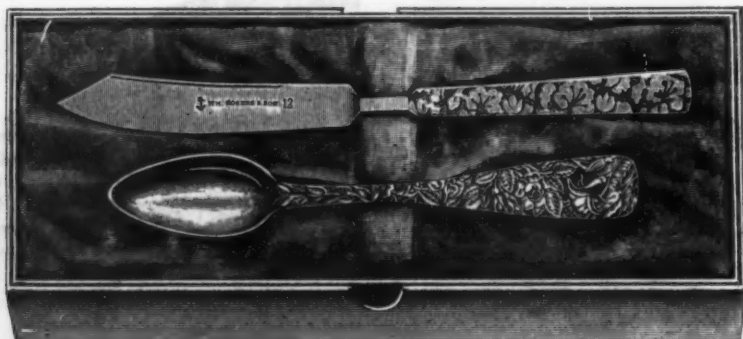
the bit to touch lightly in the corners of the mouth. It has two short levers joined to a strong spring, one on each side; one end of each lever projects backward toward the driver, and a chain or strap passing under the chin connects at each end of the bar of the bit. The other end of each lever, beginning at the corner of the mouth, tapers to the size of  $\frac{1}{4}$  inch and passes over the nose, and high enough to take its bearing on the bone just above the cartilage of the nose. The bit is operated as follows: The steel bar, to the ring of which the rim is fastened, runs through a coil spring. To the upper end of this bar is attached a flat steel spring, to the ends of which are secured rubber pads. The flat spring passes over the nose and acts as a fulcrum. Pulling on the reins presses the rubber pads, with the aid of the levers, into the channel of the nostrils, shutting off the breath of the horse, and thus bringing the animal under control. The bit is adjusted to prevent

the horse from opening the mouth to any considerable extent. It is stated that while driving, the spring, attached to the lever on each side of the bit, will stand a pull of from 10 to 200 pounds, and that when so pulled the rubber knobs close in upon the nostrils and stop the breathing, the chain under the chin curbing or shutting the mouth, compelling the horse to stop immediately. When the hold is re-

laxed the bit returns to its original position. Testimonials from representative horsemen testify to the esteem in which The Automatic Safety Bit is held.

#### Orange Knife and Spoon.

The Wm. Rogers Mfg. Company, Hartford, Conn., are putting on the market an orange knife and spoon, as illustrated herewith. The knives are furnished in



Orange Knife and Spoon.

plain satin, arabesque and old silver finish. The spoons may be had in silver, satin bowls; gilt, satin bowl and burnished gilt bowls. These knives and spoons are put up in sets, in a neat satin-lined box, as shown in the illustration; also one or six in a box, as desired. We are advised that the demand for these good is large, especially in sets.

#### Crown Padlock.

Van Wagoner & Williams Company, 82 Beekman street, New York, are introducing their No. 5 Crown Padlock, as illus-



Fig. 1.—Crown Padlock.

trated herewith. This lock is made of real bronze metal, with brass springs, tumblers, &c. Two flat steel keys accompany



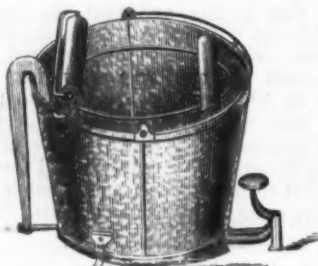
Fig. 2.—Key for Crown Lock.

each lock, as shown in Fig. 2. The manufacturers claim that the lock cannot be picked and that it will not rust. It is

compact and graceful in appearance, great care being taken in its construction, resulting in a neat and durable lock.

#### Pittsburgh Mop Wringer.

Pittsburgh Mop Wringer Company, 205 Wood street, Pittsburgh, Pa., are introducing a mop wringer, as illustrated herewith. It consists of a bucket and wringer combined, being a galvanized-steel bucket

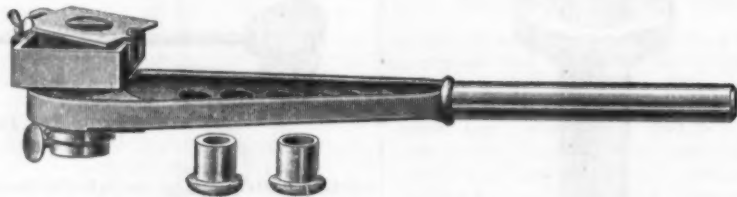


Pittsburgh Mop Wringer.

wringer cannot be upset; that not being of wood, the bucket will not fall to pieces, nor will the wringer become odorous from the filthy and repulsive matter wrung from the mop; that by its use time, labor and clothing is saved, and as the hands do not come in contact with the water, chapped, scalded and sore hands are avoided, as well as sprained wrists. A thread mop is sold by the manufacturers in connection with the wringer.

#### Ratchet Die Stock.

The Lowell Wrench Company, Worcester, Mass., are introducing a die stock, at



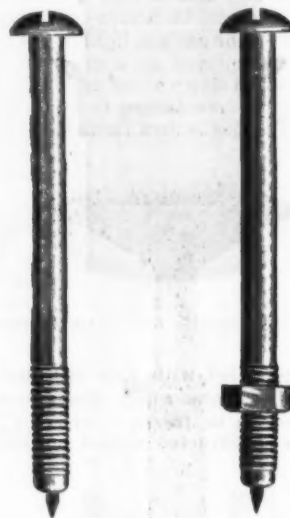
Ratchet Die Stock.

illustrated herewith. It is referred to as having the working parts well protected from dirt, and as working in close quarters. It is designed for threading water, steam and gas pipes in confined places

without removing the pipes. Indorsements from companies who have used them for these purposes substantiate these claims.

#### Pencil Specialties.

The Cross Pen Company, 168 and 170 Devonshire street, Boston, have made additions to their line of pencil specialties, as illustrated herewith. These show the round head bolt pencil and round head screw pencil. These are fully nickel plated, and described as being perfect



Pencil Specialties.

imitations of the different articles. They are of convenient size for the vest pocket, as well as being neat and novel.

The A. W. Coates & Co., Alliance, Ohio, are offering the trade pliable endless clothes lines made of twisted galvanized wire, with seven strands, from  $\frac{1}{4}$  to  $\frac{1}{2}$  inch in diameter. They are designed for use on bracket wheels, fastened at different points, thus enabling the person hanging out clothes to stand at one place and send out the washing. The lengths in which they are used are 200-foot lines, with two wheels, and two 50-foot lines on double brackets, with four wheels; where the space is not sufficient to use a single line. They may be used from a porch or doorstep, or by those occupying flats. They are also recommended for liverymen in drying robes, blankets, &c.

#### Combined Gas Stand and Stove.

Edwin S. Rich, with office at No. 2289 Second avenue, New York, has placed upon the market a combined portable gas stand and stove, a view of which is shown in the accompanying illustration. As indicated in the engraving, the device is in position for heating or cooking. It is constructed with an inside sliding illumina-

ating gas burner provided with a projecting side handle for sliding it up and down. The lower portion of the burner is connected to a flexible tube passing out through an opening in the base and con-



necting with the gas supply. The manufacturer states that the gas passes through the tube connecting at the base of the device, then upward through the burner, and mixes with about 90 per cent. of air, which enters through two vertical slots provided for the purpose, and burns without smoke and with great heat. On the top of the hollow burner tube is placed a strong globe ring or holder for receiving cooking vessels. When the device is employed for illuminating purposes the gas burner is moved up as far as it will go by means of the projecting side handle clearly indicated in the engraving, and is held in position by a thumb screw. It is then only necessary to turn on the gas and light it. When the device is employed as a gas stove the burner is pushed down as far as it will go and the thumb screw turned to hold it in position. The gas is then turned on and



Combined Gas Stand and Stove.

a match held about 3 inches above the top of the burner until the gas ignites. The cooking utensil or vessel is then placed on the globe holder. The flame can be regulated by using a 4, 5 or 6 foot tip, according to the quality of the gas available. When the device is used as a heater, a sheet-iron drum is made to rest on the globe ring, while an attachment is also furnished by means of which soldering irons may be heated. When it is used as a lamp for illuminating purposes a shade rests on the globe ring.

There is a movement on foot to form an automatic sprinkler trust, and the indications at present are that it will be consummated, provided certain difficulties can be overcome. The project is to embrace in the trust four of the leading sprinklers, viz., Grinnell, Walworth, Hill and Neracher, to sell all sprinklers at one price, leaving the choice of heads to the purchaser, and divide the profits upon an equitable basis. Frederick Grinnell, John Hill and President Barber of the Neracher Company are all favorable to and urge the enterprise. The Walworth Company cannot be induced to enter the trust, but are willing to sell out, having named a price therefor. The trust cannot be formed without the Walworth Company, and the probability is that the purchase will be made. Negotiations for the proposed trust are being carried on chiefly by Mr. Barber of the Neracher Company, who is prominently identified with the Standard Oil Trust, and is well qualified to put this sprinkler deal through in excellent shape.

### Photography in Colors.

Interest in the possibility of reproducing natural colors on a photographic plate has been increased by the results of experiments by Prof. O. Lippmann, a member of the faculty of the Academy of Paris and member of the Academy of Sciences of France, who has succeeded in fixing unalterably the colors of the spectrum on the sensitized film. Frank La Manna, president of the Brooklyn Academy of Photography, a leading organization of amateurs, called on Professor Lippmann recently and secured a specimen plate, which he has forwarded to his organization for exhibition during the annual meeting of the American Photographic Conference in this city next week. Mr. La Manna has written an interesting account of Professor Lippmann's important discovery and the processes which led up to it. He says: "The image of the spectrum is a direct positive, and it is obtained by processes as beautifully simple as they are scientifically exact. A beam from an electric arc light, in this instance of 25 amperes, passes successively through a condenser—a water bath—to divest it of heat rays, a direct-vision prism with slit of about 2 mm., a lens, reducing the system to parallel rays; a double convex lens to reduce the image, and the spectrum is then focused for average intensity of color on the ground glass. The film which is to receive the image must be structureless and sensitized uniformly—that is, it must be transparent, or at least only slightly opalescent and free from the grainy textures of the usual commercial emulsions. The ordinary wet plate, well washed, fulfills these conditions.

Professor Lippmann has experimented successfully with gelatine, albumen and collodion as films, and either iodide or bromide of silver as sensitizers. The plate is placed, film side in, against a U-shaped piece of rubber, a piece of ordinary glass is placed against the other side of this U, and the three are firmly clamped together, making a sort of trough 2 or 3 mm. through, which is filled with quicksilver. The film and the metallic mercury are, therefore, in contact. This trough is substituted for the ground glass in the camera. With the sensitive film in the plane of correct focus, a sufficient exposure is given, and the plate developed in the usual way. The brightness of the colors depends in a great measure on the whiteness of the silver deposit. These colors do not appear until after the plate is dry. During these operations the electric light is contained in a light, tight box, from which the beam issues through a shutter or door when needed.

The specimen obtained by Mr. La Manna, which is the first that has gone out from Professor Lippmann's laboratory, is an albumenized collodion film sensitized in a 10 per cent. nitrate of silver solution. The entire field of the spectrum was exposed for three minutes without any interposing color screen, the total distance of light from the plate being about 1 m. It was developed with pyrogallie acid and seaqui-carbonate of soda, until the entire surface of the spectrum was well brought out, which required about five minutes. It was fixed in the usual hyposulphite solution, very carefully washed, and the result is an exquisitely beautiful band of colors.

Professor Lippmann explained the principal of the production to Mr. La Manna as follows: "During exposure, the beam of light has passed through the glass supporting the film, through the transparent film itself, and then reflected from the surface of mercury in contact back through the film, the reflecting rays colliding with the incident rays and forming fringes of interference; that is, at those points with-

flected rays are in the same phase or direction of vibration. A maximum effect of light is produced, per contra, where the rays are in opposite phases. Vibration is annulled, obscurity results, and there is absence of effect. The result on development is a series of infinitely thin laminae or strata, with planes parallel to the surface of the film, each in thickness half a wave length of the color which produced them, and this same distance apart one from the other. In a film, say  $\frac{1}{10}$  mm. thick (the 500th of an inch) over 150 such layers would result from the red ray, 220 from the yellow and 250 from the violet. The colors, therefore, are not as pigments; they are but the decomposition of the white light by which the plate is viewed, and are analogous to the play of light on a soap bubble, or the iridescence of mother of pearl, but even purer and more brilliant, providing that development has produced highly reflecting white layers of silver, and necessarily the greater the number of reflecting layers the richer the reflected colors appear."

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**Chucks—**

Beach Pat. each, \$5.00.....30%  
 Morse's Adjustable, each, \$7.00, 30%  
 Danbury, each, \$4.00, 30%  
 Syracuse, each, \$4.00, 30%  
 Graham Patent.....33%  
 Skinner's Patent Chucks.....33%  
 Combination Lathe Chucks.....33%  
 Universal Lathe Chucks.....40%  
 Independent Lathe Chucks.....40%  
 Drill Chucks.....40%  
 Union Mfg. Co.,  
 Victor.....\$5.50, 35%  
 Combination.....40%  
 Universal.....40%  
 Independent.....40%

**Churns.**

Timb Union, each, 5 gal. \$3.25; 7 gal.,  
 \$3.75; 10 gal., \$4.25.  
 McDermid Star Barrel Churn, each,  
 6 gal., \$2.60; 10 gal., \$2.75; 15 gal.,  
 \$3.00; 20 gal., \$3.25.

**Clamps—**

R. L. Tool Co.'s Wrought Iron.....25%  
 Adjustable, Cincinnati.....15%  
 Adjustable, Cincinnati.....15%  
 Adjustable, Cincinnati.....15%  
 Stearns' Adjustable Cabinet and Cor-  
 ner.....30%  
 Cabinet, Sargent's.....60%  
 Carriage Makers', Sargent's.....70%  
 Carriage Makers', F. S. & W. Co., 40%  
 Eberhard Mfg. Co., 40%  
 Parallel, C. H. Beily & Co., 25%  
 Warner's.....40%  
 Saw Clamps, see Vises, Saw Filers.  
 Carpenters', Cincinnati.....25%

**Cleavers.**

Butchers'.  
 Bradley's.....25%  
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 Beatty's.....40%  
 New Haven Edge Tool Co.'s.....40%  
 P. S. & W.....33%  
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**Clips—**

Norway Axle, 1/4 & 5-16.....55%  
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 Wrought-Iron Felloe Clips.....60%  
 Steel Felloe Clips.....60%  
 Baker Axle Clips.....60%

Cloth and Netting, Wire—See  
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Cocks, Brass.....50%

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Medford Fancy Goods Co., 40%  
 Embossed, Gilt, Pope & Steven's list  
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 Brass, Pope & Steven's list, 40%  
 Chapman Mfg. Company.....50%

**Combs, Curry.**

Fitch's.....50%  
 Rubber, per dos \$10.00.....20%  
 Perfect.....20%  
 Kellogg's.....20%  
 Sweet & Clark's.....20%

**Compasses, Dividers, &c.—**

Compasses, Calipers, Dividers, 70%  
 Dividers.....50%  
 Compasses & Calipers.....50%  
 Wing and Inside or Outside.....50%  
 Double.....50%  
 (Call's Pat. Inside).....50%  
 Excelsior.....50%  
 J. Stevens & Co.'s.....50%  
 Starrett's.....50%  
 Spring Calipers and Dividers.....25%  
 Lock Calipers and Dividers.....25%  
 Combination Dividers.....25%

**Coopers' Tools—See Tools, Coopers'.****Cord—**

Sash.  
 Common.....\$ 10 @ 11¢  
 Patent, good quality, \$ 13 @ 13¢  
 White Cotton Braided, fair, \$ 26 @ 27¢  
 Common Russia Sash.....\$ 13 @ 14¢  
 Patent.....\$ 15 @ 16¢  
 Cable Laid Italian Sash.....\$ 29 @ 30¢  
 Indian Cable Laid.....\$ 13 @ 14¢  
 Silver Lake.....\$ 10 @ 11¢  
 A Quality, White, 50%.....10¢  
 B Quality, White, 50%.....10¢  
 C Quality, White, 50%.....10¢  
 D Quality, White, 50%.....10¢  
 E Quality, White, 50%.....10¢  
 F Quality, White, 50%.....10¢  
 G Quality, White, 50%.....10¢  
 H Quality, White, 50%.....10¢  
 I Quality, White, 50%.....10¢  
 J Quality, White, 50%.....10¢  
 K Quality, White, 50%.....10¢  
 L Quality, White, 50%.....10¢  
 M Quality, White, 50%.....10¢  
 N Quality, White, 50%.....10¢  
 O Quality, White, 50%.....10¢  
 P Quality, White, 50%.....10¢  
 Q Quality, White, 50%.....10¢  
 R Quality, White, 50%.....10¢  
 S Quality, White, 50%.....10¢  
 T Quality, White, 50%.....10¢  
 U Quality, White, 50%.....10¢  
 V Quality, White, 50%.....10¢  
 W Quality, White, 50%.....10¢  
 X Quality, White, 50%.....10¢  
 Y Quality, White, 50%.....10¢  
 Z Quality, White, 50%.....10¢  
 Braided, White Cotton, 50%.....30%  
 Braided, Drab Cotton, 50%.....30%  
 Braided, Italian Hemp, 50%.....30%  
 Braided, Linen, 50%.....30%  
 Tate's Cot'n Braided, White, \$ 5 @ 5¢  
 Tate's Cot'n Braided, Drab, \$ 5 @ 5¢  
 Wire Picture.  
 Braided or Twisted.....75%

**Corkscrews—See Screws, Cork.****Corn Knives and Cutters—See**

Knives, Corn.

**Crackers, Nut—**

Table (H. & B. Mfg. Co.).....40%  
 Blake's Pattern.....\$ 2 @ 2.00, 10%  
 Turner & Seymour Mfg. Co.....50%

**Cradles—**

Grain.....50%

**Crayons.**

White Crayons, \$ gross.....10%  
 D. M. Stewart Mfg. Co., Metal Work-  
 ers, \$ gr. \$2.50.....25%  
 D. M. Stewart Mfg. Co., Rolling Mill,  
 \$ gr. \$2.50.....25%

**Crow Bars—See Bars, Crow.****Curry Combs—See Combs, Curry.****Curtains Pins—See Pins, Curtain.****Cutters—****Meat.**

Dixon's \$ dos.....40%  
 Nos. 1 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100  
 Woodruff's \$ dos.....40%  
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 Hales Pattern \$ dos.....40%  
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 Each.....\$ 7 \$ 10 \$ 15 \$ 20 \$ 25 \$ 30 \$ 35 \$ 40 \$ 45 \$ 50 \$ 55 \$ 60 \$ 65 \$ 70 \$ 75 \$ 80 \$ 85 \$ 90 \$ 95 \$ 100  
 Enterprise.....40%  
 Nos. 1 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100  
 Each.....\$ 3 \$ 3.50 \$ 4 \$ 4.50 \$ 5 \$ 5.50 \$ 6 \$ 6.50 \$ 7 \$ 7.50 \$ 8 \$ 8.50 \$ 9 \$ 9.50 \$ 10 \$ 10.50 \$ 11 \$ 11.50 \$ 12 \$ 12.50 \$ 13 \$ 13.50 \$ 14 \$ 14.50 \$ 15 \$ 15.50 \$ 16 \$ 16.50 \$ 17 \$ 17.50 \$ 18 \$ 18.50 \$ 19 \$ 19.50 \$ 20 \$ 20.50 \$ 21 \$ 21.50 \$ 22 \$ 22.50 \$ 23 \$ 23.50 \$ 24 \$ 24.50 \$ 25 \$ 25.50 \$ 26 \$ 26.50 \$ 27 \$ 27.50 \$ 28 \$ 28.50 \$ 29 \$ 29.50 \$ 30 \$ 30.50 \$ 31 \$ 31.50 \$ 32 \$ 32.50 \$ 33 \$ 33.50 \$ 34 \$ 34.50 \$ 35 \$ 35.50 \$ 36 \$ 36.50 \$ 37 \$ 37.50 \$ 38 \$ 38.50 \$ 39 \$ 39.50 \$ 40 \$ 40.50 \$ 41 \$ 41.50 \$ 42 \$ 42.50 \$ 43 \$ 43.50 \$ 44 \$ 44.50 \$ 45 \$ 45.50 \$ 46 \$ 46.50 \$ 47 \$ 47.50 \$ 48 \$ 48.50 \$ 49 \$ 49.50 \$ 50 \$ 50.50 \$ 51 \$ 51.50 \$ 52 \$ 52.50 \$ 53 \$ 53.50 \$ 54 \$ 54.50 \$ 55 \$ 55.50 \$ 56 \$ 56.50 \$ 57 \$ 57.50 \$ 58 \$ 58.50 \$ 59 \$ 59.50 \$ 60 \$ 60.50 \$ 61 \$ 61.50 \$ 62 \$ 62.50 \$ 63 \$ 63.50 \$ 64 \$ 64.50 \$ 65 \$ 65.50 \$ 66 \$ 66.50 \$ 67 \$ 67.50 \$ 68 \$ 68.50 \$ 69 \$ 69.50 \$ 70 \$ 70.50 \$ 71 \$ 71.50 \$ 72 \$ 72.50 \$ 73 \$ 73.50 \$ 74 \$ 74.50 \$ 75 \$ 75.50 \$ 76 \$ 76.50 \$ 77 \$ 77.50 \$ 78 \$ 78.50 \$ 79 \$ 79.50 \$ 80 \$ 80.50 \$ 81 \$ 81.50 \$ 82 \$ 82.50 \$ 83 \$ 83.50 \$ 84 \$ 84.50 \$ 85 \$ 85.50 \$ 86 \$ 86.50 \$ 87 \$ 87.50 \$ 88 \$ 88.50 \$ 89 \$ 89.50 \$ 90 \$ 90.50 \$ 91 \$ 91.50 \$ 92 \$ 92.50 \$ 93 \$ 93.50 \$ 94 \$ 94.50 \$ 95 \$ 95.50 \$ 96 \$ 96.50 \$ 97 \$ 97.50 \$ 98 \$ 98.50 \$ 99 \$ 99.50 \$ 100 \$ 100.50  
 Great American Meat Cutter.....40%  
 Nos. 1 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100  
 Each.....\$ 3.00 \$ 3.25 \$ 3.50 \$ 3.75 \$ 4.00 \$ 4.25 \$ 4.50 \$ 4.75 \$ 5.00 \$ 5.25 \$ 5.50 \$ 5.75 \$ 6.00 \$ 6.25 \$ 6.50 \$ 6.75 \$ 7.00 \$ 7.25 \$ 7.50 \$ 7.75 \$ 8.00 \$ 8.25 \$ 8.50 \$ 8.75 \$ 9.00 \$ 9.25 \$ 9.50 \$ 9.75 \$ 10.00 \$ 10.25 \$ 10.50 \$ 10.75 \$ 11.00 \$ 11.25 \$ 11.50 \$ 11.75 \$ 12.00 \$ 12.25 \$ 12.50 \$ 12.75 \$ 13.00 \$ 13.25 \$ 13.50 \$ 13.75 \$ 14.00 \$ 14.25 \$ 14.50 \$ 14.75 \$ 15.00 \$ 15.25 \$ 15.50 \$ 15.75 \$ 16.00 \$ 16.25 \$ 16.50 \$ 16.75 \$ 17.00 \$ 17.25 \$ 17.50 \$ 17.75 \$ 18.00 \$ 18.25 \$ 18.50 \$ 18.75 \$ 19.00 \$ 19.25 \$ 19.50 \$ 19.75 \$ 20.00 \$ 20.25 \$ 20.50 \$ 20.75 \$ 21.00 \$ 21.25 \$ 21.50 \$ 21.75 \$ 22.00 \$ 22.25 \$ 22.50 \$ 22.75 \$ 23.00 \$ 23.25 \$ 23.50 \$ 23.75 \$ 24.00 \$ 24.25 \$ 24.50 \$ 24.75 \$ 25.00 \$ 25.25 \$ 25.50 \$ 25.75 \$ 26.00 \$ 26.25 \$ 26.50 \$ 26.75 \$ 27.00 \$ 27.25 \$ 27.50 \$ 27.75 \$ 28.00 \$ 28.25 \$ 28.50 \$ 28.75 \$ 29.00 \$ 29.25 \$ 29.50 \$ 29.75 \$ 30.00 \$ 30.25 \$ 30.50 \$ 30.75 \$ 31.00 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Wire Brads & Nails, see Nails, Wire.	
Steel-Wire Brads, R. & E. Mfg. Co.'s	
List.....	50¢10¢
<b>Tapes, Measuring—</b>	
American.....	40¢40¢5¢
Spring.....	40¢
Chesterman's, Regular List.....	25¢30¢
<b>Thermometers—</b>	
Tin Case.....	80¢80¢10¢
<b>Thimble Skelns—See Skelns.</b>	
<b>Ties, Bale—Steel</b>	
Standard Wire, List.....	50¢10¢5¢
<b>Tinners' Shears, &amp;c.—See Shears,</b>	
<b>Tinners', &amp;c.</b>	
<b>Tinware—</b>	
Stamped, Japanned and Plead, List	
Jan. 20 1887.....	70¢10¢70¢10¢5¢
<b>Tire Benders, Upsetters, &amp;c.—</b>	
See Benders and Upsetters, Tire.	
<b>Tools.</b>	
<b>Coopers'—</b>	
Bradley's.....	20¢
Barton's.....	20¢20¢5¢
L. & J. White.....	20¢5¢
Albertson Mfg. Co.....	20¢
Beatty's.....	20¢
Sandusky Tool Co.....	80¢90¢5¢
Shaves, Cincinnati Tool Co.....	30¢
<b>Lumber.</b>	
Ring Peavies, "Blue Line".....	50¢90.00
Ring Peavies, Common.....	50¢18.00
Steel Socket Peavies.....	50¢21.00
Mall, Iron Socket Peavies.....	50¢19.00
Cant Hooks, "Blue Line".....	50¢10.00
Cant Hooks, Common Finish.....	50¢14.00
Cant Hooks, Mall, Socket Clasp, "Blue	
Line" Finish.....	50¢10.00
Cant Hooks, Mall, Socket Clasp, Com-	
mon Finish.....	50¢14.50
Cant Hooks, Clip Clasp, "Blue Line"	
Finish.....	50¢14.00
Cant Hooks, Clip Clasp, Common Fin-	
ish.....	50¢12.00
Hand Spikes.....	50¢6 ft., \$15.00; 8 ft., \$20.00
Pike Poles, Pike & Hook.....	50¢12 ft., \$11.50; 14 ft., \$12.50; 16 ft., \$14.50; 18 ft., \$17.50; 20 ft., \$21.50
Pike Poles, Pike only.....	50¢12 ft., \$10.00; 14 ft., \$11.00; 16 ft., \$13.00; 18 ft., \$15.00; 20 ft., \$18.00
Pike Poles, not ironed.....	50¢12 ft., \$6.00; 14 ft., \$7.00; 16 ft., \$9.00; 18 ft., \$12.00; 20 ft., \$16.00
Setting Poles.....	50¢12 ft., \$14.00; 14 ft., \$15.00; 16 ft., \$17.00
Swamp Hooks.....	50¢18.00
<b>Saw.</b>	
Atkins' Perfection.....	50¢17.00
Atkins' Excelsior.....	50¢16.00
Atkins' Giant.....	50¢14.00
<b>Tobacco Cutters—See Cutters, To-</b>	
<b>bacco.</b>	
<b>Transom Lifters—See Lifters,</b>	
<b>Transom.</b>	
<b>Traps—</b>	
<b>Game—</b>	
Newhouse.....	40¢40¢5¢
Oneida Pattern.....	70¢10¢
Game, Blake's Patent.....	40¢10¢5¢

<b>Mouse and Rat—</b>	
Mouse Wood Choker.....	11¢12¢
Mouse, Round Wire.....	50¢1.50, 10¢
Mouse, Cage, Wire.....	50¢2.50, 10¢
Mouse, Catch-em-alive.....	50¢2.50 10¢
Mouse, Bonanza.....	50¢2.90 \$1.00
Rat, Decoy.....	50¢1.00, 10¢
Dead.....	50¢1.00
Cyclone.....	50¢1.25
Hotchkiss Metallic Mouse, 5-hole traps	
50¢, 10¢; in full cases.....	50¢7.5¢
Hotchkiss Imp. Rat Killer.....	50¢18.50
Hotchkiss New Rat Killer.....	50¢16.50
Schuyler's Rat Killer.....	50¢15.00
<b>Triers—</b>	
Butter and cheese.....	35¢
<b>Trimmers, Spoke.</b>	
Bonney's.....	50¢10.00, 50¢
Stearns'.....	50¢10.00
Ives, No. 1, \$15.00; No. 2, \$12.00.....	50¢10.00
Douglas'.....	50¢9.00, 20¢
Cincinnati.....	20¢
<b>Trowels—</b>	
Lothrop's Brick and Plastering.....	20¢10¢5¢35¢
Reed's Brick and Plastering.....	15¢
Dixon's Br'k and Plastering.....	25¢
Peace's Plastering.....	25¢
Clement & Maynard's.....	20¢
Rose's Brick.....	15¢20¢
Brade's Brick.....	25¢
Worral's Brick and Plastering.....	20¢
Garden.....	70¢
<b>Trucks, Warehouse, &amp;c.—</b>	
B. & L. Block Co.'s List.....	40¢
<b>Tubes, Boiler—</b>	
See Pipe.	
<b>Twine—</b>	
Flax Twine.....	BC. B.
No. 0, 1/4 and 1/2 B. Balls.....	20¢ 34¢
No. 12, 1/4 and 1/2 B. Balls.....	25¢ 33¢
No. 18, 1/4 and 1/2 B. Balls.....	25¢ 32¢
No. 24, 1/4 and 1/2 B. Balls.....	25¢ 32¢
No. 30, 1/4 and 1/2 B. Balls.....	20¢ 31¢
No. 36, 1/4 and 1/2 B. Balls.....	15¢ 31¢
Chalk Line, Cotton, 1/4 B. Balls.....	25¢
Mason Line, Linen, 1/4 B. Balls.....	50¢
2-Ply Hemp, 1/4 and 1/2 B. Balls.....	15¢
Twine.....	15¢
3-Ply Hemp, 1/4 B. Balls.....	10¢15¢
Cotton Wrapping, 5 Balls to a.....	15¢10¢
2, 3, 4 and 5-Ply Jute, 1/4 B. Balls.....	10¢
Paper.....	15¢10¢
Cotton Mops, 6, 9, 12 and 15 B. to do.....	15¢
<b>Vises—</b>	
Solid Box.....	50¢10¢50¢10¢5¢
<b>Parallels.</b>	
Fisher & Norris Double Screw.....	15¢10¢
Stephens'.....	25¢30¢
Parker's.....	30¢25¢
Wilson's.....	50¢
Howard's.....	40¢
Bonney's.....	40¢10¢
Milner's.....	40¢10¢
Trenton.....	40¢10¢
Merrill's.....	15¢20¢
Sargent's.....	80¢10¢10¢
Backus and Union.....	40¢
Double Screw Leg.....	15¢10¢
Frontiss.....	20¢25¢
Simpson's Adjustable.....	40¢
Moore's.....	40¢
Massey Quick Action.....	20¢ 25¢
<b>Saw Vises—</b>	
Bonney's, Nos. 2 & 3.....	50¢10¢
Stearns'.....	33¢10¢33¢10¢10¢
Stearns' Silent Saw Vises.....	33¢40¢35¢

Sargent's.....	60¢10¢
Hopkins.....	50¢17.50, 10¢
Reading.....	40¢10¢
Wentworth.....	20¢10¢
<b>Miscellaneous.</b>	
Combination Hand Vises.....	50¢42.00
Cowell Hand Vises.....	30¢
Bauer's Pipe Vises.....	10¢
Cincinnati.....	25¢10¢
Enterprise Pipe Vises, each.....	50¢
Massey Combination Pipe.....	40¢
<b>Wagon Boxes—See Boxes, Wagon.</b>	
<b>Washer Cutters—See Cutters</b>	
<b>Washer.</b>	
<b>Wagon Jacks—See Jacks, Wagon.</b>	
<b>Ware, Hollow, Enameled, &amp;c.</b>	
<b>Cast Iron, Hollow—</b>	
Stove Hollow-Ware.....	60¢10¢
Ground.....	60¢10¢10¢
Ungrind.....	60¢10¢10¢
White Enamel-Ware.....	70¢
Maslin Kettles.....	40¢10¢50¢5¢
Boilers and Saucepans.....	40¢10¢50¢5¢
Tinned Boilers and S'pans.....	40¢10¢50¢5¢
Rustless Hollow-Ware.....	50¢50¢5¢
Gray Enamel-Ware.....	50¢
Stove.....	50¢
Maslin Kettles.....	60¢10¢10¢
Boilers and Saucepans.....	40¢5¢
<b>Enameled—</b>	
Agate and Granite Ware, List Jan. 1,	
1889.....	33¢10¢
Ironclad Enamel Ware.....	33¢10¢
<b>Kettles—</b>	
Galvanized Tea-Kettles.....	7 8 9
Inch.....	55¢ 60¢ 75¢
Each.....	55¢ 60¢ 75¢
<b>Standard Fiber—</b>	
Per Dozen.	
Wash-Basins, 10 1/2 in.....	\$2.00 \$2.25
Wash-Basins, 12 in.....	2.25 2.75
Keelers, 11 1/2 in.....	4.00
Cuspidors.....	8.00
Spittoons, "Daisy," 8 in.....	4.00
Peck Measure.....	4.00
Half-peck Measure.....	3.50
<b>Indurated Fiber—25¢</b>	
Spittoons, No. 2, 50¢.....	\$9.00
Basins, Ring-d, 50¢.....	\$4.80
No. 3.....	\$4.30
Wash-tubs, Nested, Nos. 0, 1, 2 and 3	
(pieces).....	\$7.50
Keelers, Nested, Nos. 1, 2, 3 and 4	
(pieces).....	\$3.70
Bowl, 15, 17 and 19-inch	
(pieces).....	\$3.25
Liquid Measures, pt., qt., 2 qt. and fun-	
nell (4 pieces).....	\$3.00
Dry Measures, 1, 2, 4, 8 and 16 qts. (5	
pieces).....	\$3.00
See also <i>Patls.</i>	
<b>Silver Plated, Hollow—</b>	
4 mo. or 5¢ cash in 30 days.	
Reed & Barton.....	40¢5¢
Meriden Britannia Co.....	40¢5¢
Simpson, Hall, Miller & Co.....	40¢5¢
Rogers & Brother.....	40¢5¢
Hartford Silver Plate Co.....	40¢5¢
William Rogers Mfg. Co.....	40¢5¢
<b>Washers—</b>	
Size hole.....	5-16 1/4 1/2 3/4 to 1 1/2
Washers.....	6 8 8.50 9
In lots less than 200.....	5¢, add 1/4¢, 5-3
boxes 1¢ to list.	
<b>Wedges—</b>	
Iron.....	50¢ 35¢
Steel.....	50¢ 35¢
<b>Weights, Sash—</b>	
Solid Eyes.....	50¢ ton \$18¢\$19

<b>Well Buckets, Galvanized—See</b>	
<b>Buckets, Well, Galvanized.</b>	
<b>Wheels, Well.</b>	
8 in., \$2.25; 10 in., \$2.70; 12 in., \$3.25	
<b>Wire and Wire Goods—</b>	
<b>Iron—</b>	
Market.....	
Br. & Ann., Nos. 0 to 18.....	77¢1/2
Cop'd, Nos. 0 to 18.....	75¢
Galv., Nos. 0 to 18.....	67¢1/2
Tin'd, Tinned List Nos. 0 to 18.....	67¢1/2
Stone.....	
Br. and Ann'd, Nos. 16 to 18.....	77¢1/2
Bright and Ann'd, Nos. 19 to 20.....	80¢
Br. and Ann'd, Nos. 27 to 28.....	82¢1/2
Tinned.....	
Tinned Broom Wire, 18 to 21, 1/2.....	5¢
Galvanized Fence, Nos. 8 and 9.....	70¢
Galvanized Fence, Nos. 8 and 9.....	70¢
Galvanized Grade, Nos. 10 to 12.....	80¢
Brass, List Jan. 18, 1884.....	35¢
Copper, List Jan. 18, 1884.....	35¢
Barb Fence.....	See Trade Report
Galvanized Wire on Spools.....	50¢
Maslin's Steel and Tin'd on Spools.....	50¢
Maslin's Brass and Cop. on Spools.....	45¢
Tate's Spooled, Tinned and Annealed.....	45¢
Tate's Spooled Cop. and Brass.....	45¢
Cast Steel Wire.....	50¢ to \$1.35
Stub's Steel Wire.....	\$6.00 to \$1.35
Steel Music Wire, 12 to 20.....	60¢ to 70¢
Wire Clothes Lines, see Lines.	
Wire Picture Cord, see Cord.	
<b>Bright Wire Goods—</b>	
Standard List.....	80¢10¢
<b>Wire Cloth and Netting.</b>	
Painted Screen Cloth, good quality,	
\$100 sq. ft., \$1.40	
Galvanized Wire Netting.....	70¢10¢75¢
<b>Wire Rope—See Rope, Wire.</b>	
<b>Wrenches—</b>	
American Adjustable.....	40¢
Baxter's Adjustable "B".....	40¢10¢50¢
Baxter's Diagonal.....	40¢10¢50¢
Coe's Genuine.....	60¢25¢
Coe's "Mechanics".....	60¢10¢25¢
Girard Standard.....	65¢10¢
Lamson & Sessions' Engineer.....	60¢10¢
Lamson & Sessions' Standard.....	70¢10¢
P. S. & W. Agricultural.....	75¢5¢ to 75¢
Girard Agricultural.....	81¢
Lamson & Sessions' Agric'l.....	81¢
Bemis & Call's.....	
Pat. Combination.....	35¢
Merrick's Pattern.....	25¢
Briggs' Pattern.....	25¢
Cylinder or Gas Pipe.....	40¢5¢
No. 3 Pipe.....	40¢10¢
Alken's Pocket (Bright).....	\$6.00, 50¢10¢
The Favorite Pocket.....	\$4.00, 40¢
Webster's Pat. Combination.....	25¢
Boardman's.....	35¢25¢
Always Ready.....	35¢25¢
Aligator.....	50¢
Donohue's Engineer.....	30¢10¢
Acme, Bright.....	50¢25¢
Acme, Nickle.....	40¢25¢
Hercules.....	70¢
Walker's.....	55¢25¢
Diamond Steel.....	55¢25¢
Cincinnati Brace Wrenches.....	55¢10¢
Tate's Vise Wrench.....	55¢10¢25¢
<b>Wringers, Clothes—</b>	
List September 30, 1890, 25¢ cash.	
<b>Wrought Goods—</b>	
Staples, Hooks, &c., List Jan. 12, 1889.	
85¢35¢41¢	

## PAINTS, OILS AND COLORS.—Wholesale Prices.

<b>Animal and Vegetable Oils.</b>	
Linseed, City, raw, per gal.....	57 62
Linseed, City, boiled.....	60 65
Linseed, Western, raw.....	55 60
Lard, City, Extra Winter.....	57 62
Lard, City, Prime.....	55 60
Lard, City, Extra No. 1.....	40 45
Lard, City, No. 1.....	40 45
Lard, Western, prime.....	32 35
Cotton-seed, Crude, prime.....	32 35
Cotton-seed, Crude, off	
grades.....	25 30
Cotton-seed, Summer Yel-	
low, prime.....	40 41
Cotton-seed, Summer Yel-	
low, off grades.....	32 38
Sperm, Crude.....	72 73
Sperm, Natural Spring.....	72 73
Sperm, Bleached Spring.....	72 73
Sperm, Natural Winter.....	72 73
Sperm, Bleached Winter.....	72 73
Whale, Crude.....	54 56
Whale, Natural Winter.....	54 56
Whale, Bleached Winter.....	54 56
Whale, Extra Bleached.....	54 56
Sea Elephant, Bleached	
Winter.....	63 64
Menhaden, Crude, Sound.....	25 26
Menhaden, Crude, Southern	
Menhaden, Light Pressed.....	20 20
Menhaden, Bleached W'ter.....	31 32
Menhaden, Extra Bleached	
Tallow, City, prime.....	33 35
Tallow, Western, prime.....	44 45
Cocoonut, Ceylon.....	64 67
Cocoonut, Cochia.....	64 67
Cod, Domestic.....	43 45
Cod, Foreign.....	36 38
Red Saponified.....	36 38
Bank, per gal.....	27 28
Strait.....	28 29
Olive, Italian, bbls.....	72 73
Neatsfoot, prime.....	55 56
Palm, prime, Lagos.....	6 6 6 1/2
<b>Mineral Oils.</b>	
Black, 20 gravity, 25 to 30	
cold test.....	7 1/2 8
Black, 20 gravity, 15 cold	
test.....	8 1/2 9
Black, 20 gravity, summer.	
test.....	6 1/2 7
Cylinder light, altered.....	15 20

Cylinder, dark, altered.....	12 15
Cylinder, dark, 4 1/2 in red.....	12 15
Paraffine, 23 1/2 to 24 gravity.....	12 1/2 14
Paraffine, 25 gravity.....	12 1/2 13
Paraffine, 28 gravity.....	9 10
Paraffine, red, 21 to 22 gr'ty.....	9 10
Paraffine, red, 22 1/2 to 23 gr'ty.....	13 14
<b>Paints and Colors.</b>	
Barytes, Foreign, 7 ton.....	\$22.00 \$24.00
Barytes, Amer. floated.....	30.00 32.00
Barytes, Amer. No. 1.....	19.00 20.00
Barytes, Amer. No. 2.....	13.00 16.00
Barytes, Amer. No. 3.....	11.00 12.00
Blue, Celestial.....	6 8
Blue, Chinese.....	60 65
Blue, Prussian.....	26 40
Blue, Ultramarine.....	8 25
Brown, Spanish.....	1 1/2 1
Brown, Vandyke, Amer.....	3 3 1/2
Brown, Vandyke, English.....	6 8
Carmin, No. 40, in bulk.....	3.10 ..
Carmin, No. 40, in boxes	
or barrels.....	3.20 ..
Carmin, No. 40, in ounce	
bottles.....	4.30 ..
Chalk, in bulk.....	2.75 3.00
Chalk, in bbls.....	100 33 40
China Clay, English.....	10 15.00
Cobalt Oxide, prep'd.....	3.00 ..
Cobalt Oxide, black.....	lots 100 2.60 ..
Cobalt, Oxide, black.....	less 100 2.05 ..
Green, Paris, in bulk.....	14 15 1/2
Green, Paris, 170 to 175.....	14 15 1/2
Green, Paris, small pack.....	18 21 1/2
Green, Chrome, ordinary.....	8 11
Green, Chrome, pure.....	23 25
Lead, Eng., B.B. white.....	8 10
Lead, Amn. White, dry or in oil:	
Kegs, lots less than 1000.....	7 1/2
Kegs, lots 1000 to 5 tons.....	6 1/2
Kegs, lots 5 tons to 13 tons.....	11 1/2
Kegs, lots 13 tons and over.....	6 1/2
Lead White in oil 25 to 30	
pails add to keg price.....	1 1/2
Lead, White, in oil, 12 1/2 to 14	
pails, add to keg price.....	1

Lead, White, in oil, 1 to 5 as-		
sorted tins, add to keg price.....		2 1/2
Lead, Red, bbls. and 1/2 bbls.....	6 1/2	7
Lead, Red, kegs.....	6 1/2	7 1/2
Litharge, kegs.....	6 1/2	7 1/2
Litharge, bbls. and 1/2 bbls.....	6 1/2	7
<b>TERMS, &amp;c.—Lead and Litharge.—On</b>		
<b>lots of 1000 or over, 60 days' time or</b>		
<b>2 1/2 % discount for cash if paid within 15</b>		
<b>days of date of invoice.</b>		
Ocher, Rochella.....	1.35	1 1/2
Ocher, French Washed.....	1 1/2	3 1/2
Ocher, German Washed.....	1 1/2	3
Ocher, American.....	1 1/2	1 1/2
Orange Mineral, English.....	9	9 1/2
Orange Mineral, French.....	10	10 1/2
Orange Mineral, German.....	9 1/2	10
Orange Mineral, American.....	8	8 1/2
Paris White, English Cliff-		
stone.....	1.00	1.15
Paris White, American.....	70	75
Red, Indian, English.....	5 1/2	7
Red, Indian, American.....	5	6 1/2
Red, Turkey.....	9	11 1/2
Red, Tuscan.....	9	11
Red, Venetian, American.....	\$ 100	\$ 1.00 1.15
Red, Venetian, English.....	1.00	1.15
Renna, Italian, Burnt and		
Powd., &c.....	5	6 1/2
Sienna, Ital., Burnt.....	1 1/2	1 1/2
Sienna, Ital., Raw, Powd.,		
&c.....	3	3 1/2
Sienna, Ital., Raw Lumps.....	3	3 1/2
Sienna, American, Raw.....	1 1/2	1 1/2
Sienna, American, Burnt		
and Powdered.....	1 1/2	1 1/2
Talc, French.....	1 1/2	1 1/2
Talc, Italian.....	1 1/2	1 1/2
Terra Alba, Fr'ch., 100 lb	90	100
Terra Alba, English.....	60	60
Terra Alba, American No. 1	70	75
Terra Alba, American No. 2	40	50
Umber, Turkey, Bnt. and		
Powd., &c.....	3 1/2	4
Umber, Turkey, Raw and		
Powdered.....	3 1/2	4
Umber, Turkey, R/w Lmps	2 1/2	3 1/2
Umber, Turkey, R/w Amer.	1 1/2	1 1/2
Umber, Turkey, R/w Amer.	1 1/2	1 1/2
Vermillion, Chrome.....	12	12 1/2
Vermillion Americ. Lead.....	11 1/2	12
Vermillion, Quicksilver, bulk	04	06
Vermillion, Quicksilver, bags	06	07
Vermillion, Quicksilver,		
smaller pags.....	09	11
Vermillion, English Import	00	35

# CURRENT METAL PRICES.

MAY 27, 1891.

The following quotations are for small lots. Wholesale prices, at which large lots only can be bought, are given elsewhere in our weekly market reports

## IRON AND STEEL.

### Bar Iron from Store.

Common Iron:	
1 to 2 in. round and square...	2.00 @ 2.10
1 to 6 in. x 1/2 to 1 in. ....	
Refined Iron:	
1 to 2 in. round and square...	2.10 @ 2.30
1 to 4 in. x 1/2 to 1 1/4 in. ....	
4 1/2 to 6 in. x 1/2 to 1 in. ....	
1 to 6 in. x 1/2 and 5-16 .....	2.30 @ 2.50
Rods—1/2 and 11-16 round and sq. ...	2.20 @ 2.40
Bands—1 to 6 x 3-16 to No. 12 .....	2.40 @ 2.60
"Burden Best" Iron, base price .....	3.00
Burden's "H. B. & S." Iron, base price .....	2.80
"Uster" .....	3.00
Norway Bars .....	4.00
Norway Shapes .....	5.00

### Merchant Steel from Store.

Open-Hearth and Bessemer Machinery, Toe Calk, Tire and Sleigh Shoe, base price in small lots .....	2 3/4
Best Cast Steel, base price in small lots .....	8
Best Cast Steel Machinery, base price in small lots .....	5

### Sheet Iron from Store.

	Common American.	R. G.	Cleaned.
10 to 16 .....	3.00 @ 3.00	3.35	
17 to 20 .....	3.15 @ 3.25	3.35	3.75
21 to 24 .....	3.35 @ 3.35	3.60	
25 and 26 .....	3.35 @ 3.35	3.60	
27 .....	3.50 @ 3.60	3.85	
28 .....	3.65 @ 3.65	4.10	
Galv'd, 14 to 20 .....	4.75 @ 4.75	4.60	
Galv'd, 21 to 24 .....	5.12 @ 5.12	5.00	
Galv'd, 25 to 26 .....	5.50 @ 5.50	5.35	
Galv'd, 27 .....	5.90 @ 5.90	5.70	
Galv'd, 28 .....	6.25 @ 6.25	6.10	
Patent Planchet .....	10 1/4 @ 10 1/4	B. 96	
Russia .....	10 1/4 @ 10 1/4	B. 116	
American Cold Rolled B. B. ....	5 1/2 @ 5 1/2	7 1/2	
Orang Polished Sheet Steel .....	8 1/4 @ 8 1/4		

### English Steel from Store.

Best Cast .....	15
Extra Cast .....	16 1/2
Swaged, Cast .....	16
Best Double Shear .....	15
Blister, 1st quality .....	12
German Steel, Best .....	10
2d quality .....	9
3d quality .....	8
Sheet Cast Steel, 1st quality .....	15
2d quality .....	14
3d quality .....	12 1/2
R. Mushet's "Special" .....	48
"Titanic" .....	30

## METALS.

### Tin.

Sanca, Pigs .....	22 1/4
Straits, Pigs .....	21 @ 21 1/4
Straits in Bars .....	23

### Tin Plates.

	Charcoal Plates.—Bright.	Per box.
Melvin Grade.	IC, 10 x 14 .....	6.50
"	IC, 12 x 12 .....	6.75
"	IC, 14 x 20 .....	6.40
"	IC, 20 x 28 .....	13.20
"	IX, 10 x 14 .....	8.00
"	IX, 12 x 12 .....	8.25
"	IX, 14 x 20 .....	8.00
"	IX, 20 x 28 .....	16.00
"	DC, 12 1/2 x 17 .....	6.00
"	DX, 12 1/2 x 17 .....	7.20
Calland Grade.	IC, 10 x 14 .....	6.50
"	IC, 12 x 12 .....	6.75
"	IC, 14 x 20 .....	6.40
"	IX, 10 x 14 .....	7.65
"	IX, 12 x 12 .....	8.00
"	IX, 14 x 20 .....	7.65
Allaway Grade.	IC, 10 x 14 .....	6.15
"	IC, 12 x 12 .....	6.30
"	IC, 14 x 20 .....	6.15
"	IC, 20 x 28 .....	12.00
"	IX, 10 x 14 .....	7.30
"	IX, 12 x 12 .....	7.60
"	IX, 14 x 20 .....	7.30
"	IX, 20 x 28 .....	14.00
"	DC, 12 1/2 x 17 .....	5.80
"	DX, 12 1/2 x 17 .....	6.00

### Coke Plates.—Bright.

Steel Coke.—IC, 10 x 14, 14 x 20 .....	5.70
" 10 x 20 .....	7.85
" 20 x 28 .....	11.20
IX, 10 x 14, 14 x 20 .....	6.60
3V Grade.—IC, 10 x 14, 14 x 20 .....	5.70

### Charcoal Plates.—Terns.

Lean Grade.—IC, 14 x 30 .....	5.45
" 20 x 28 .....	10.60
IX, 14 x 30 .....	6.20
" 20 x 28 .....	12.35
Abecarne Grade.—IC, 14 x 30 .....	5.25
" 20 x 28 .....	10.60
IX, 14 x 30 .....	6.35
" 20 x 28 .....	12.35

## Tin Boiler Plates.

IX, 14 x 26 .....	112 sheets .....	13.50
IX, 14 x 28 .....	112 sheets .....	13.75
IX, 14 x 31 .....	112 sheets .....	15.35

## Copper.

Duty: Pig, Bar and Ingot, 1 1/4¢; Old Copper, 1¢  
 B. Manufactured (including all articles of which Copper is a component of chief value), 3 1/2¢ ad valorem.

## Ingot.

Lake .....	15
Ansonia Grade Arizona .....	13 1/4
Ansonia Grade Casting .....	12 1/4

## Sheet and Bolt.

Prices adopted by the Association of Copper Manufacturers of the United States, December 5, 1890, being quotations for all sized lots.

	Not wider than	Not longer than	Not longer than	Weights per square foot and prices per pound.
				Over 54 oz.
				22 to 64 oz.
				16 to 32 oz.
				14 to 16 oz.
				12 to 14 oz.
				10 to 12 oz.
				8 to 10 oz.
				Less than 8 oz.
30-72 .....				30
30-72 .....				31
36-96 .....				32
36-96 .....				33
48-96 .....				34
48-96 .....				35
60-96 .....				36
60-96 .....				37
84-96 .....				38
84-96 .....				39
Over 84 in. wide .....				40

All Bath Tub Sheets.... 16 oz. 14 oz. 12 oz. 10 oz.  
 Per pound..... \$0.27 \$0.29 \$0.31 \$0.35  
 Bolt Copper, 1/2 inch diameter and over, per pound..... 22¢  
 Circles, 60 inches in diameter and less, 8 cents per pound advance over lowest prices of Sheet Copper of the same thickness.

## Copper Bottoms, Pits and Flats.

14 ounce to square foot and heavier ..... 26 || 12 ounce and up to 14 ounce to square foot ..... | 27 |
10 ounce and up to 12 ounce .....	28
Lighter than 10 ounce .....	32
Circles less than 8 inches diameter 2 cents per pound additional.	
Circles over 18 inches diameter are not classed as Copper Bottoms.	

## Tinning.

Tinning sheets on one side, 10, 12 and 14 x 48 each ..... 8 || Tinning sheets on one side, 30 x 60 each ..... | 30 |
For tinning boiler sizes, 9 in. (sheets 14 in. x 60 in.), each .....	15
For tinning boiler sizes, 8 in. (sheets 14 in. x 56 in.), each .....	12
For tinning boiler sizes, 7 in. (sheets 14 in. x 52 in.), each .....	13
Tinning sheets on one side, other sizes, per square foot .....	21
For tinning both sides double the above prices.	

## Planchet Brass and Copper.

14 x 48, 14 x 52, 14 x 56, 14 x 60 in.  
 14 and 16 oz. and heavier ..... 33 || 12 oz. and lighter ..... | 35 |
| 24 x 48 and 30 x 60 ..... | 30 |
| 14 and 16 oz. and heavier ..... | 30 |

## Seamless Brass and Copper Tubes.

O. G.	N. G.	%	%	%	%	%	1	1
8-14	6-12	87	33	80	29	28	27	
15	13	28	34	81	30	29	28	2
16	14	39	34	82	31	30	29	2
17	15	40	35	38	40	31	30	2
18	16	42	36	34	32	31	30	2
19	17	37	37	36	34	32	32	
20	18-19	44	39	37	36	33	34	
21	20	46	41	39	38	37	36	3
22	21	48	42	40	39	38	37	3
23	22	50	44	42	41	40	39	3
24	23	43	43	44	43	41	40	3
25	24	56	49	45	45	44	43	4